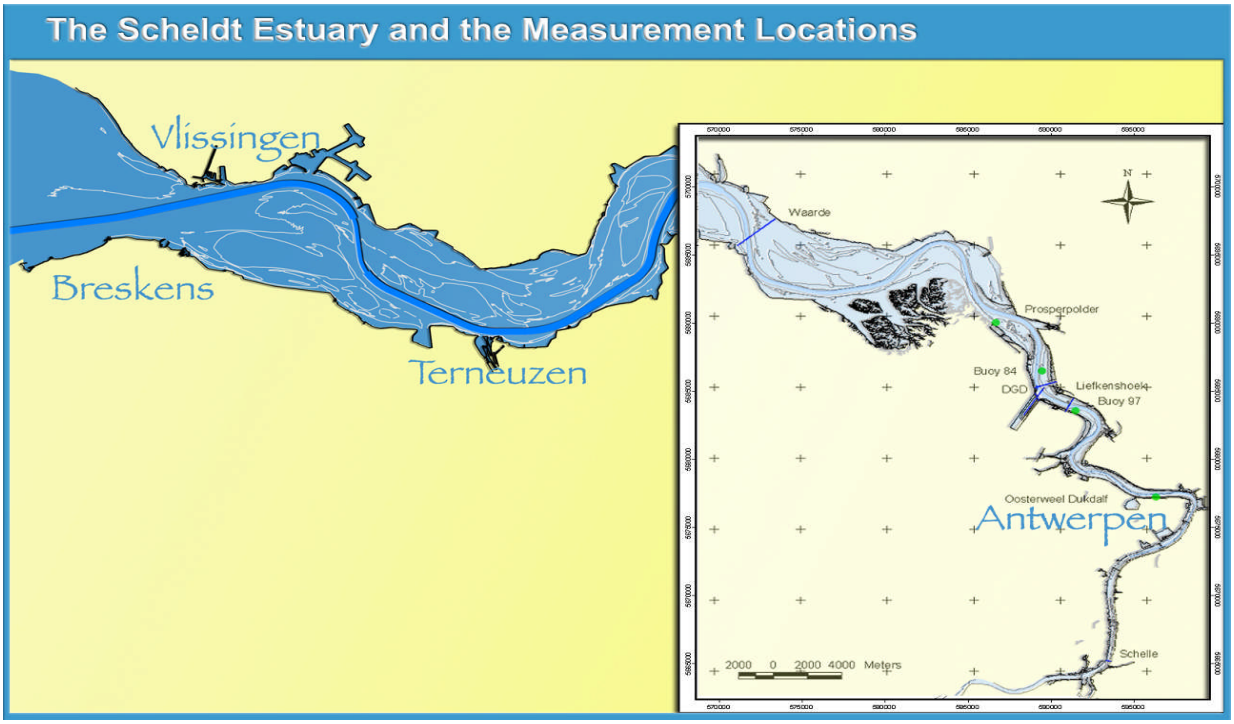
VLAAMSE OVERHEID
DEPARTEMENT MOBILITEIT EN OPENBARE WERKEN

WATERBOUWKUNDIG LABORATORIUM

Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing

Bestek 16EB/05/04



Deelrapport 3.13: Omgevingscondities in de rivier de Schelde januari – maart 2008

Report 3.13: Overview of boundary conditions in the river Scheldt January – March 2008

05 September 2008

I/RA/11283/07.100/MSA

i.s.m. WL | delft hydraulics en GEMS International

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2.0	05/09/08	YDK	Final report
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Name	# ex.	Company/Authorities	Position in reference to the project
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2.0	05/09/08	YDK	MBO	MSA
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1. INTRODUCTION

1.1. The assignment

This report is part of the set of reports describing the results of the long-term measurements conducted in Deurganckdok aiming at the monitoring and analysis of silt accretion. This measurement campaign is an extension of the study "Extension of the study about density currents in the Beneden Zeeschelde" as part of the Long Term Vision for the Scheldt estuary. It is complementary to the study 'Field measurements high-concentration benthic suspensions (HCBS 2)'.

The terms of reference for this study were prepared by the 'Departement Mobiliteit en Openbare Werken van de Vlaamse Overheid, Afdeling Waterbouwkundig Laboratorium' (16EB/05/04). The repetition of this study was awarded to International Marine and Dredging Consultants NV in association with WL|Delft Hydraulics and Gems International on 10/01/2006. The project term was prolonged with an extra year from April 2007 till March 2008.

Waterbouwkundig Laboratorium– Cel Hydrometrie Schelde provided data on discharge, tide, salinity and turbidity along the river Scheldt and provided survey vessels for the long term and through tide measurements. Afdeling Maritieme Toegang provided maintenance dredging data. Agentschap voor Maritieme Dienstverlening en Kust – Afdeling Kust and Port of Antwerp provided depth sounding measurements.

The execution of the study involves a twofold assignment:

- Part 1: Setting up a sediment balance of Deurganckdok covering a period of one year, i.e. 04/2007 – 03/2008
- Part 2: An analysis of the parameters contributing to siltation in Deurganckdok

1.2. Purpose of the study

The Lower Sea Scheldt (Beneden Zeeschelde) is the stretch of the Scheldt estuary between the Belgium-Dutch border and Rupelmonde, where the entrance channels to the Antwerp sea locks are located. The navigation channel has a sandy bed, whereas the shallower areas (intertidal areas, mud flats, salt marshes) consist of sandy clay or even pure mud sometimes. This part of the Scheldt is characterized by large horizontal salinity gradients and the presence of a turbidity maximum with depth-averaged concentrations ranging from 50 to 500 mg/l at grain sizes of 60 - 100 μm. The salinity gradients generate significant density currents between the river and the entrance channels to the locks, causing large siltation rates. It is to be expected that in the near future also the Deurganckdok will suffer from such large siltation rates, which may double the amount of dredging material to be dumped in the Lower Sea Scheldt.

Results from the study may be interpreted by comparison with results from the HCBS and HCBS2 studies covering the whole Lower Sea Scheldt. These studies included through-tide measurement campaigns in the vicinity of Deurganckdok and long term measurements of turbidity and salinity in and near Deurganckdok.

The first part of the study focuses on obtaining a sediment balance of Deurganckdok. Aside from natural sedimentation, the sediment balance is influenced by the maintenance and capital dredging works. This involves sediment influx from capital dredging works in the Deurganckdok, and internal relocation and removal of sediment by maintenance dredging works. To compute a sediment balance an inventory of bathymetric data (depth soundings), density measurements of the

deposited material and detailed information of capital and maintenance dredging works will be made up.

The second part of the study is to gain insight in the mechanisms causing siltation in Deurganckdok, it is important to follow the evolution of the parameters involved, and this on a long and short term basis (long term & through-tide measurements). Previous research has shown the importance of water exchange at the entrance of Deurganckdok is essential for understanding sediment transport between the dock and the Scheldt river.

1.3. Overview of the study

1.3.1. Reports

Reports of the project 'Opvolging aanslibbing Deurganckdok' between April 2007 till March 2008 are summarized in Table 1-1.

This report, report 3.13, is one of set of reports for understanding the sediment transport between Deurganckdok and the river Scheldt, which belongs to the second part of this project.

The report is also a continuation of the set of ambient conditions reports of HCBS2 (IMDC, 2005k; IMDC, 2005l; IMDC, 2006l; IMDC, 2006p) and 'Opvolging aanslibbing Deurganckdok' (IMDC, 2007b; IMDC, 2007u; IMDC, 2007w, 2008p). This new ambient conditions report gives an overview of the ambient conditions from January till March 2008 in the river Scheldt. An overview of the HCBS2 and 'Opvolging aanslibbing Deurganckdok' (between April 2006 till March 2007) reports are given in APPENDIX A.

Table 1-1: Overview of Deurganckdok Reports

Report	Description
Sediment Balance: Bathymetry surveys, Density measurements, Maintenance and construction dredging activities	
1.10	Sediment Balance: Three monthly report 1/4/2007 - 30/06/2007 (I/RA/11283/07.081/MSA)
1.11	Sediment Balance: Three monthly report 1/7/2007 – 30/09/2007 (I/RA/11283/07.082/MSA)
1.12	Sediment Balance: Three monthly report 1/10/2007 – 31/12/2007 (I/RA/11283/07.083/MSA)
1.13	Sediment Balance: Three monthly report 1/1/2007 – 31/03/2007 (I/RA/11283/07.084/MSA)
1.14	Annual Sediment Balance (I/RA/11283/07.085/MSA)
Factors contributing to salt and sediment distribution in Deurganckdok: Salt-Silt (OBS3A) & Frame measurements, Through tide measurements (SiltProfiling & ADCP) & Calibrations	
2.09	Calibration stationary equipment autumn (I/RA/11283/07.095/MSA)
2.10	Through tide measurement Siltprofiler 23 October 2007 (I/RA/11283/07.086/MSA)
2.11	Through tide measurement Salinity Profiling winter (I/RA/11283/07.087/MSA)
2.12	Through tide measurement Sediview winter 11 March 2008 Transect I (I/RA/11283/07.088/MSA)
2.13	Through tide measurement Sediview winter 11 March 2008 Transect K (I/RA/11283/07.089/MSA)
2.14	Through tide measurement Sediview winter 11 March 2008 Transect DGD (I/RA/11283/07.090/MSA)

Report	Description
2.15	Through tide measurement Siltprofiler 12 March 2008 (I/RA/11283/07.091/MSA)
2.16	Salt-Silt distribution Deurganckdok summer (21/6/2007 – 30/07/2007) (I/RA/11283/07.092/MSA)
2.17	Salt-Silt distribution & Frame Measurements Deurganckdok autumn (17/09/2007 - 10/12/2007) (I/RA/11283/07.093/MSA)
2.18	Salt-Silt distribution & Frame Measurements Deurganckdok winter (18/02/2008 - 31/3/2008) (I/RA/11283/07.094/MSA)
2.19	Calibration stationary & mobile equipment winter (I/RA/11283/07.096/MSA)
Boundary Conditions: Upriver Discharge, Salt concentration Scheldt, Bathymetric evolution in access channels, dredging activities in Lower Sea Scheldt and access channels	
3.10	Boundary conditions: Three monthly report 1/4/2007 – 30/06/2007 (I/RA/11283/07.097/MSA)
3.11	Boundary conditions: Three monthly report 1/7/2007 – 30/09/2007 (I/RA/11283/07.098/MSA)
3.12	Boundary conditions: Three monthly report 1/10/2007 – 31/12/2007 (I/RA/11283/07.099/MSA)
3.13	Boundary conditions: Three monthly report 1/1/2008 – 31/03/2008 (I/RA/11283/07.100/MSA)
3.14	Boundary conditions: Annual report (I/RA/11283/07.101/MSA)
Analysis	
4.10	Analysis of Siltation Processes and Factors (I/RA/11283/07.102/MSA)

1.3.2. Measurement actions

Following measurements have been carried out during the course of this project:

1. Monitoring upstream discharge in the river Scheldt.
2. Monitoring Salt and sediment concentration in the Lower Sea Scheldt taken from on permanent data acquisition sites at Oosterweel, Prosperpolder and up- and downstream of the Deurganckdok.
3. Long term measurement of salt distribution in Deurganckdok.
4. Long term measurement of sediment concentration in Deurganckdok
5. Monitoring near-bed processes in the central trench in the dock, near the entrance as well as near the landward end: near-bed turbidity, near-bed current velocity and bed elevation variations are measured from a fixed frame placed on the dock's bed.
6. Measurement of current, salt and sediment transport at the entrance of Deurganckdok for which ADCP backscatter intensity over a full cross section are calibrated with the Sediview procedure and vertical sediment and salt profiles are recorded with the SiltProfiler equipment
7. Through tide measurements of vertical sediment concentration profiles -including near bed highly concentrated suspensions- with the SiltProfiler equipment. Executed over a grid of points near the entrance of Deurganckdok.
8. Monitoring dredging activities at entrance channels towards the Kallo, Zandvliet and Berendrecht locks

9. Monitoring dredging and dumping activities in the Lower Sea Scheldt

In situ calibrations were conducted on several dates to calibrate all turbidity and conductivity sensors (IMDC, 2006a; IMDC, 2007a; IMDC, 2008f; IMDC, 2008o).

1.4. Structure of this report

This report is the factual data report for two measurement actions during the period between January and March 2008:

- Monitoring salinity and sediment concentration in the Lower Sea Scheldt taken from on permanent data acquisition sites at Oosterweel, Prosperpolder and up- (buoy 97) and downstream (buoy 84) of the Deurganckdok.
- Monitoring dredging and dumping activities in the Lower Sea Scheldt.

Beside these actions, navigation and meteorological conditions are also reported.

The first chapter comprises an introduction. The second chapter describes the project. Chapter 3 summarizes the measurement campaign, while the ambient conditions are discussed in Chapter 4.

2. SEDIMENTATION IN DEURGANCKDOK

2.1. Project Area: Deurganckdok

Deurganckdok is a tidal dock situated at the left bank in the Lower Sea Scheldt, between Liefkenshoek and Doel. Deurganckdok has the following characteristics:

1. the dock has a total length of 2750 m and is 450 m wide at the Scheldt end and 400 m wide at the inward end of the dock
2. The bottom of Deurganckdok is provided at a depth of –17m TAW in the transition zones between the quay walls and the central trench and of –19m TAW in the central trench.
3. the quay walls reach up to +9m TAW

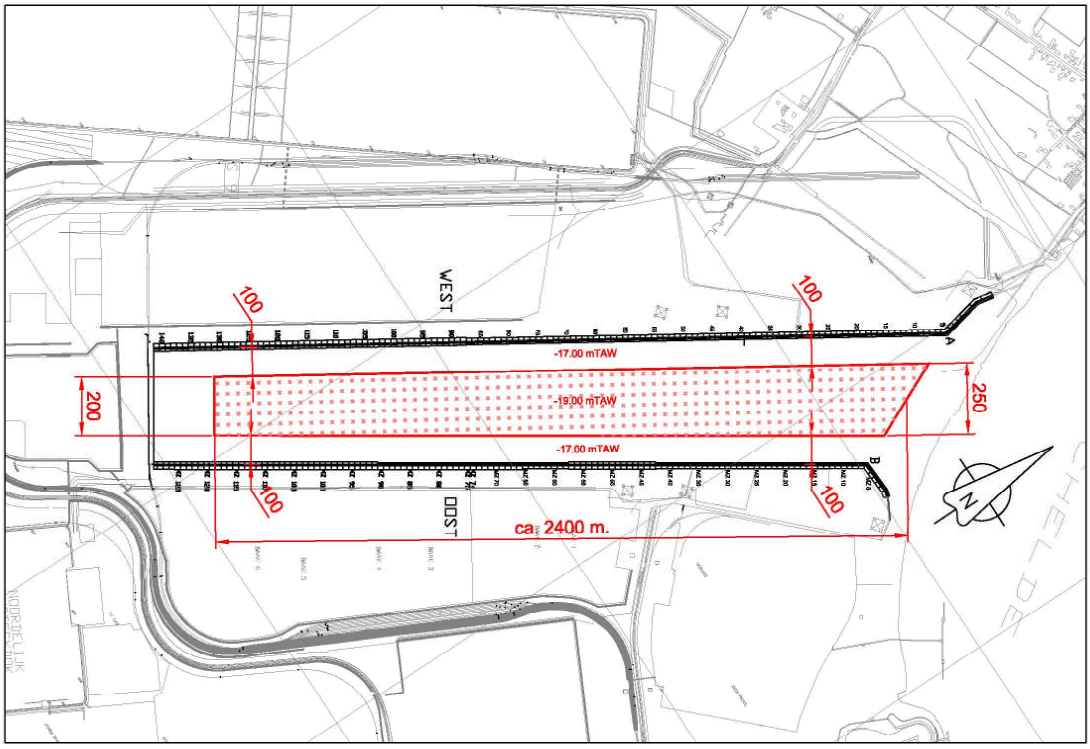

Figure 2-1: Overview of Deurganckdok

The dredging of the dock is performed in 3 phases. On 18 February 2005 the dike between the Scheldt and the Deurganckdok was breached. On 6 July 2005 Deurganckdok was officially opened. The second dredging phase was finalized a few weeks later. The first terminal operations have started since.

2.2. Overview of the studied parameters

The first part of the study aims at determining a sediment balance of Deurganckdok and the net influx of sediment. The sediment balance comprises a number of sediment transport modes: deposition, influx from capital dredging works, internal replacement and removal of sediments due to maintenance dredging (Figure 2-2).

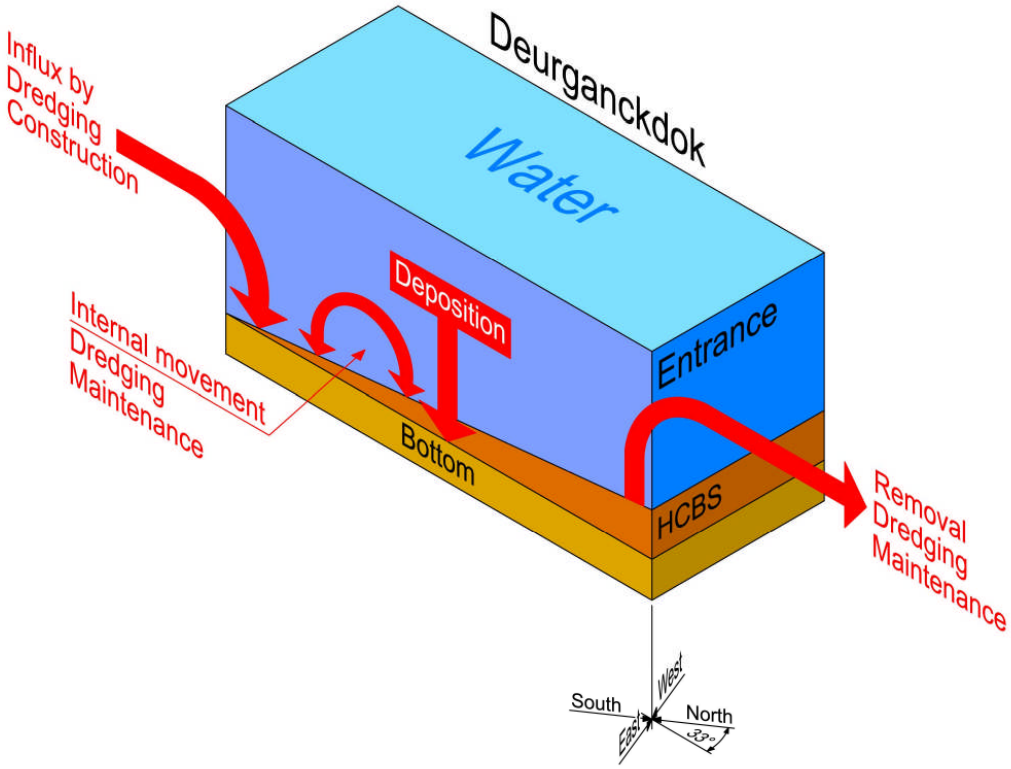

Figure 2-2: Elements of the sediment balance

A net deposition can be calculated from a comparison with a chosen initial condition t_0 (Figure 2-3). The mass of deposited sediment is determined from the integration of bed density profiles recorded at grid points covering the dock. Subtracting bed sediment mass at t_0 leads to the change in mass of sediments present in the dock (mass growth). Adding cumulated dry matter mass of dredged material removed since t_0 and subtracting any sediment influx due to capital dredging works leads to the total cumulated mass entered from the river Scheldt since t_0.

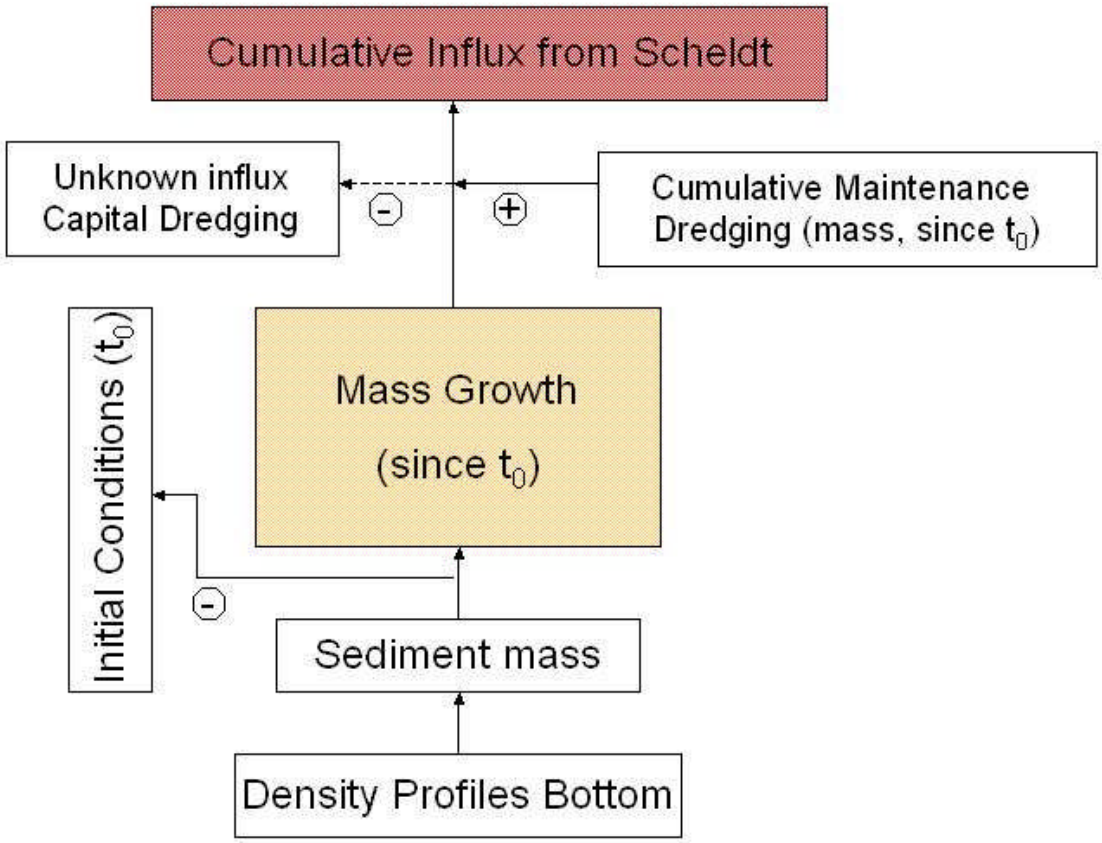

Figure 2-3: Determining a sediment balance

The main purpose of the second part of the study is to gain insight in the mechanisms causing siltation in Deurganckdok. The following mechanisms will be aimed at in this part of the study:

- Tidal prism, i.e. the extra volume in a water body due to high tide
- Vortex patterns due to passing tidal current
- Density currents due to salt gradient between the Scheldt river and the dock
- Density currents due to highly concentrated benthic suspensions

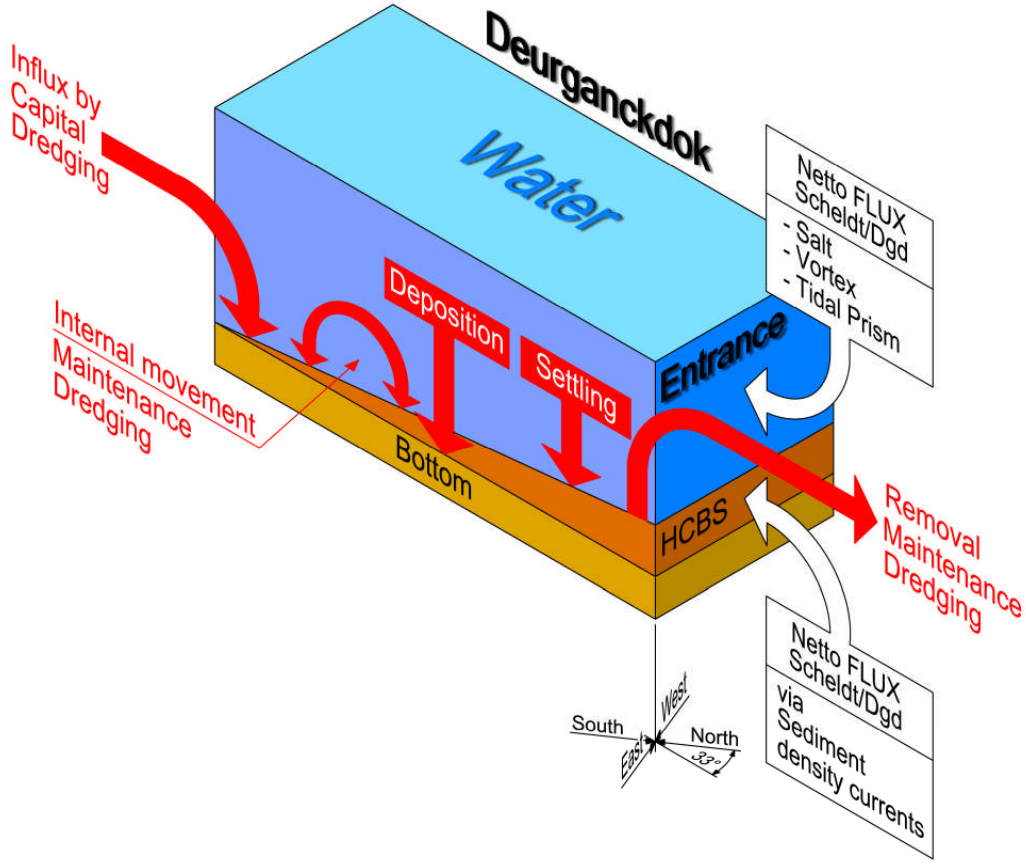

Figure 2-4: Transport mechanisms

These aspects of hydrodynamics and sediment transport have been landmark in determining the parameters to be measured during the project. Measurements will be focused on three types of timescales: one tidal cycle, one neap-spring cycle and seasonal variation within one year.

Following data are being collected to understand these mechanisms:

- Monitoring upstream discharge in the river Scheldt.
- Monitoring Salt and sediment concentration in the Lower Sea Scheldt at permanent measurement locations at Oosterweel, up- and downstream of the Deurganckdok.
- Long term measurement of salt and suspended sediment distribution in Deurganckdok.
- Monitoring near-bed processes (current velocity, turbidity, and bed elevation variations) in the central trench in the dock, near the entrance as well as near the current deflecting wall location.
- Dynamic measurements of current, salt and sediment transport at the entrance of Deurganckdok.
- Through tide measurements of vertical sediment concentration profiles -including near bed high concentrated benthic suspensions.
- Monitoring dredging activities at entrance channels towards the Kallo, Zandvliet and Berendrecht locks as well as dredging and dumping activities in the Lower Sea Scheldt.
- In situ calibrations were conducted on several dates to calibrate all turbidity and conductivity sensors.

2.3. Specific objectives of this report

The natural ambient conditions in the Scheldt estuary change from the mouth near Vlissingen to the upstream boundaries near Ghent and the tributaries. Furthermore navigation and dredging activities are important human activities in the Lower Sea Scheldt.

These natural and human conditions can help to gain insight in the mechanisms causing siltation in Deurganckdok. For this reason this report summarises the following data for the period between January and March 2008:

- Ambient characteristics in the Lower Sea Scheldt:
    - Tide
    - Current
    - Salinity
    - Temperature
    - Turbidity/Suspended sediment concentration
    - Salinity downstream

- Fresh water inflow from the tributaries
- Meteorological conditions
- Human activities
    - Dredging/dumping
    - Navigation

3. THE MEASUREMENT CAMPAIGN

3.1. Overview of the measurement campaigns

Several measurement campaigns took place between the 1st of January and the 31st of March 2008. Near bed continuous monitoring took place at the entrance of Deurganckdok, through tide measurement campaign at transect Y, DGD, K and I, long term salinity measurements at Deurganckdok and finally further long term measurements were executed near buoy 84 and buoy 97.

The long-term measurements at buoys 84 and 97 started the 21st, respectively the 20th of September 2005 and will be continued at least until the 31st of March 2008. In this period there were two short interruptions to calibrate the instruments: 13/04/2006 – 18/04/2006 and 05/09/2007 – 13/09/2007 and 30/01/2008 – 06/02/2008. Table 3-1 gives an overview of the coordinates of the measurement locations and the periods when data was gathered. Considering the through tide measurements coordinates are given for the sailed transects (i.e. left bank and right bank position). Figure 3-1 shows the Lower Sea Scheldt with the measurement locations. A sketch of each measurement campaign can be found from Figure 3-2 to Figure 3-16.

A detailed description of the near bed continuous monitoring during this reporting period can be found in IMDC (2008n). The factual data of the long-term measurements near buoy 84 and buoy 97 from January until March 2008 are given in this report.

Table 3-1: Measurement locations and periods for the HCBS2 and Deurganckdok measurements (01/01/2006 – 31/03/2008)

Through tide measurements: Transects					
Location	***Easting (UTM ED 50)***		***Northing (UTM ED 50)***		***Period***
Deurganckdok (in dock) (transect Y)	Left Bank	Right Bank	Left Bank	Right Bank	21/03/2006, 26/09/2006 & 12/03/2008
	589059	591298	5684948	5683077	
Liefkenshoek (transect I)	Left Bank	Right Bank	Left Bank	Right Bank	22/03/2006, 27/09/2006 & 11/03/2008
	590318	590771	5684257	5683302	
Deurganckdok (downstream) (transect K)	Left Bank	Right Bank	Left Bank	Right Bank	22 - 23/03/2006, 27 - 28/09/2006 & 11/03/2008
	588484	589775	5684924	5685384	
Deurganckdok (in dock) (transect DGD)	Left Bank	Right Bank	Left Bank	Right Bank	22/03/2006, 27/09/2006, 24/10/2007 & 11/03/2008
	588765	588541	5684056	5684527	
Schelle (transect S)	Left Bank	Right Bank	Left Bank	Right Bank	23/03/2006 & 28/09/2006
	592645	592953	5665794	5665682	
Waarde (transect W)	Left Bank	Right Bank	Left Bank	Right Bank	23/03/2006 & 28/09/2006
	573541	571318	5696848	5694933	

Through tide measurements: Siltprofiler gauging points			
Location	***Easting (UTM ED 50)***	***Northing (UTM ED 50)***	***Period***
Location 1: Xa	588549	5684335	21/03/2006, 26/09/2006, 23/10/2007 & 12/03/2008
Location 2: Xb	588596	5684411	
Location 3: Xc	588643	5684486	
Location 4: Xd	588690	5684562	
Location 5: Xe	588737	5684638	
Location 6: Ya	588606	5684217	
Location 7: Yb	588653	5684293	
Location 8: Yc	588700	5684368	
Location 9: Yd	588747	5684444	
Location 10: Ye	588793	5684520	
Location 11: Za	588662	5684099	
Location 12: Zb	588709	5684174	
Location 13: Zc	588756	5684250	
Location 14: Zd	588803	5684326	
Location 15: Ze	588850	5684402	
Near bed continuous monitoring			
Location	***Easting (UTM ED 50)***	***Northing (UTM ED 50)***	***Period***
Deurganckdok CDW	588653	5684906	14/03/2006 – 05/04/2006
Deurganckdok CDW	588685	5684880	19/04/2006 – 23/05/2006
Deurganckdok Sill	588805	5684170	19/04/2006 – 23/05/2006
Deurganckdok CDW	588685	5684880	18/07/2006 – 11/10/2006
Deurganckdok Sill	588805	5684170	19/07/2006 – 11/10/2006
Deurganckdok CDW	588685	5684880	15/03/2007 – 12/04/2007
Deurganckdok Sill	588805	5684170	09/02/2007 – 18/04/2007
Deurganckdok CDW	588685	5684880	26/09/2007 – 05/12/2007
Deurganckdok Sill	588805	5684170	10/10/2007 – 28/11/2007
Deurganckdok CDW	588685	5684880	20/02/2008 – 02/04/2008
Deurganckdok Sill	588805	5684170	27/02/2008 – 09/04/2008
Salt Silt measurements Deurganckdok			
Location	***Easting (UTM ED 50)***	***Northing (UTM ED 50)***	***Period***
P&O 1	588074	5682942	17/03/2006 – 28/04/2006
P&O 2	588767	5684045	17/03/2006 – 28/04/2006
PSA	588536	5684523	17/03/2006 – 28/04/2006
P&O 1	588074	5682942	20/07/2006 – 12/10/2006
P&O 2	588767	5684045	20/07/2006 – 12/10/2006
PSA	588536	5684523	20/07/2006 – 12/10/2006
P&O 1	588074	5682942	12/02/2007 – 27/03/2007
P&O 2	588767	5684045	12/02/2007 – 27/03/2007
PSA	588536	5684523	12/02/2007 – 27/03/2007
P&O 1	588074	5682942	20/06/2007 – 31/07/2007
P&O 2	588767	5684045	20/06/2007 – 31/07/2007
PSA	588536	5684523	20/06/2007 – 31/07/2007
P&O 1	588074	5682942	17/09/2007 – 10/12/2007
P&O 2	588767	5684045	17/09/2007 – 10/12/2007
PSA	588536	5684523	17/09/2007 – 10/12/2007
N entrance (PSA HNN)	588536	5684523	20/02/2008 – 28/04/2008
S entrance (DB Ports)	588767	5684045	20/02/2008 – 28/04/2008

S middle (DB Ports)	588074	5682942	20/02/2008 – 28/04/2008
S back (DB Ports)	587760	5682449	20/02/2008 – 28/04/2008
Settling velocity – INSSEV			
Location	***Easting (UTM ED 50)***	***Northing (UTM ED 50)***	***Period***
Deurganckdok CDW	588717	5684898	05/09/2006
Deurganckdok SILL	588800	5684250	06/09/2006
Deurganckdok Western quay wall	588452	5684355	07/09/2006

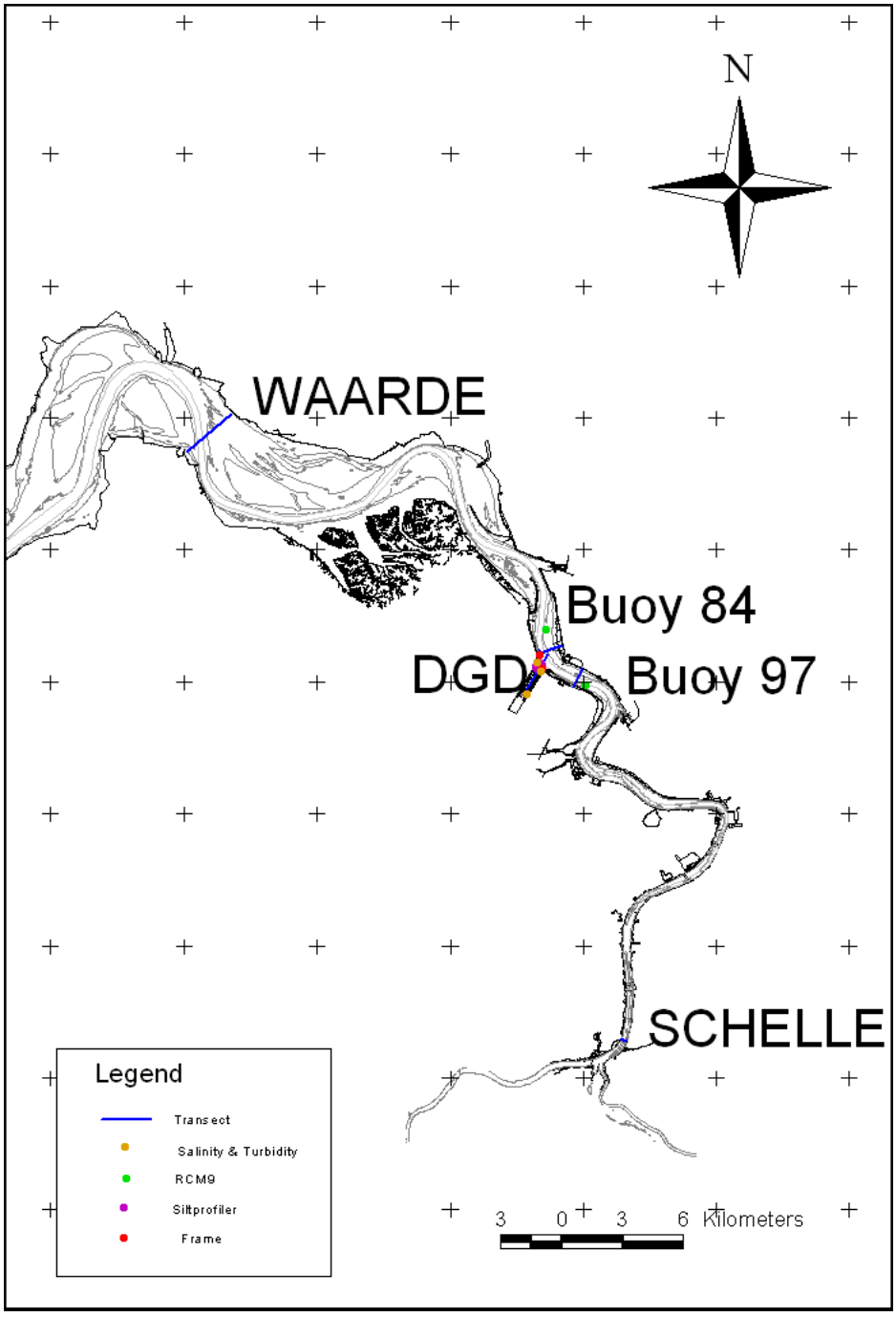

Figure 3-1: The measurement locations in the Lower Sea Scheldt and Deurganckdok (01/01/2006 – 31/03/2008)

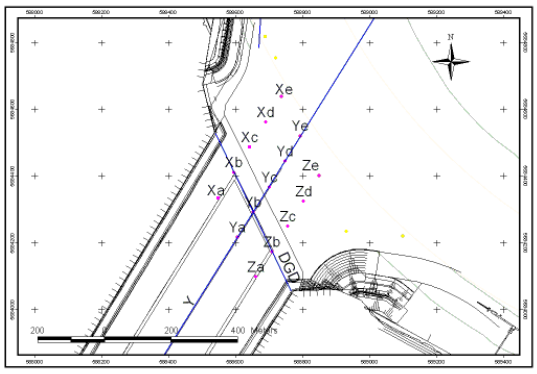

Figure 3-2: Through tide SiltProfiler measurements – Entrance Deurganckdok

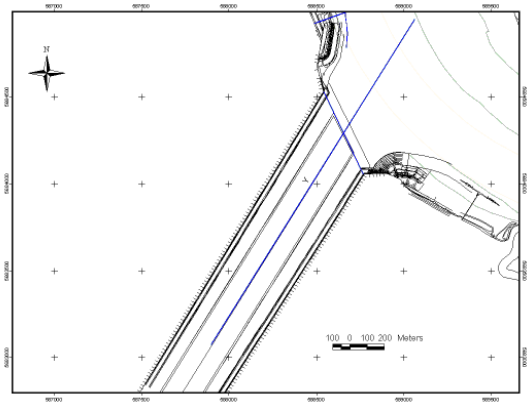

Figure 3-3: Through tide Salinity measurements – Deurganckdok (transect Y)

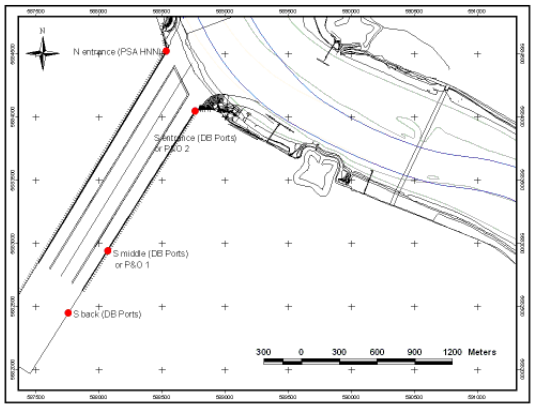

Figure 3-4: Long term salinity measurements Deurganckdok

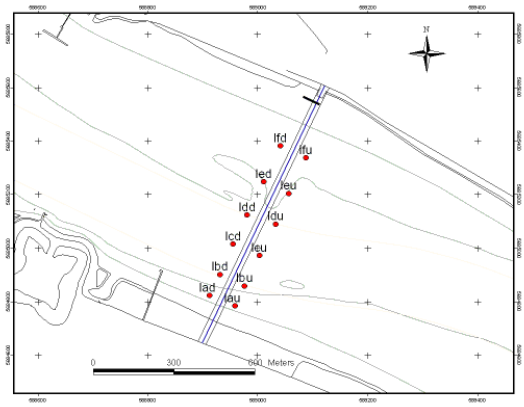

Figure 3-5: Through tide ADCP & SiltProfiler measurements – Upstream Deurganckdok (transect I)

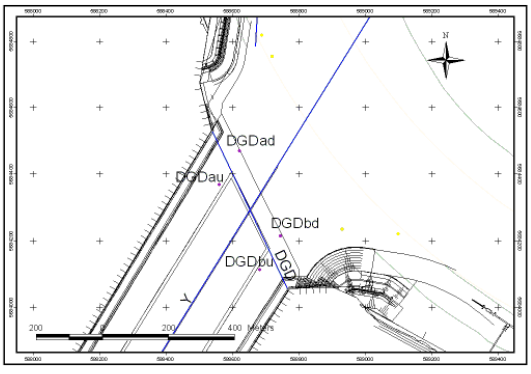

Figure 3-6: Through tide ADCP measurements – Entrance Deurganckdok (transect DGD)

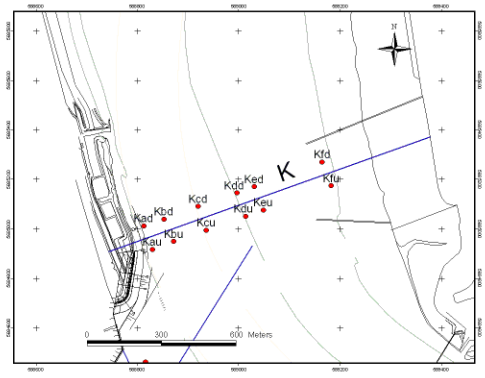

Figure 3-7: Through tide ADCP & SiltProfiler measurements – Downstream Deurganckdok (Transect K)

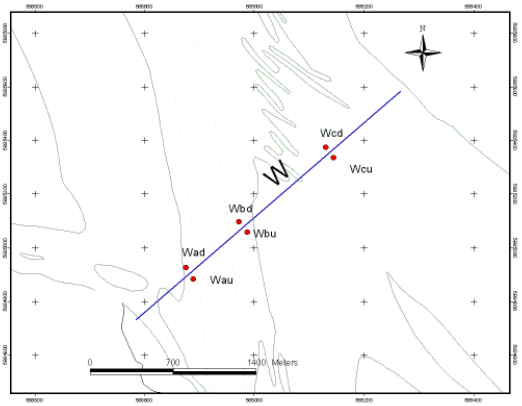

Figure 3-8: Through tide ADCP measurements - Waarde (transeect W)

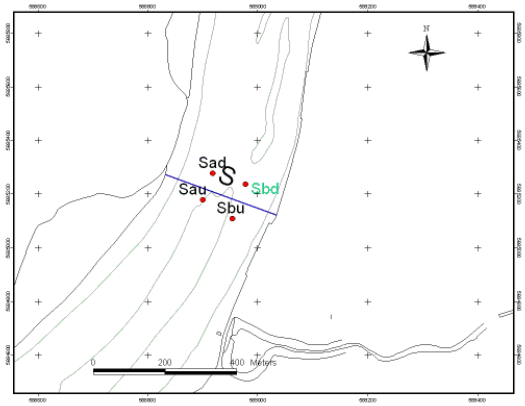

Figure 3-9: Through tide ADCP measurements - Schelle (transeect S)

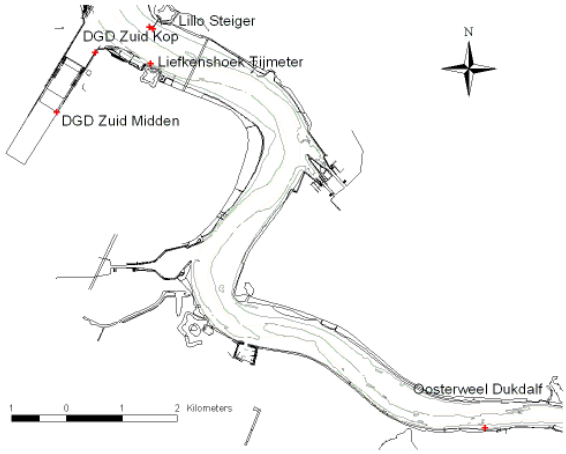

Figure 3-10: Calibration measurements - 15/03/2006 & 14/04/2006

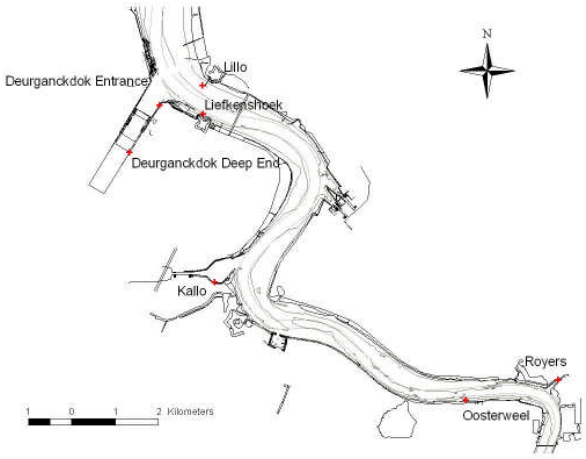

Figure 3-11: Calibration measurements – 23/06/2006 & 18/09/2006

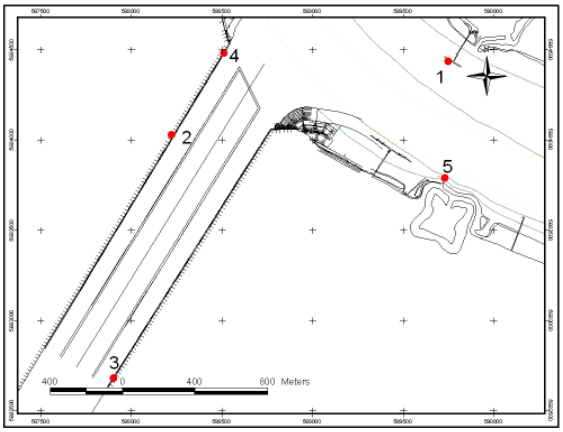

Figure 3-12:Calibration measurements – 10/09/2008

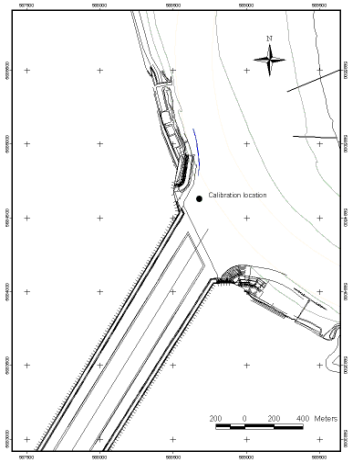

Figure 3-13:Calibration measurements – 04/02/2008 & 05/02/2008

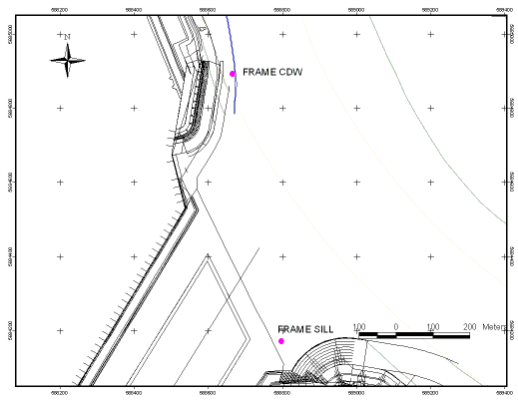

Figure 3-14:Near bed continuous monitoring

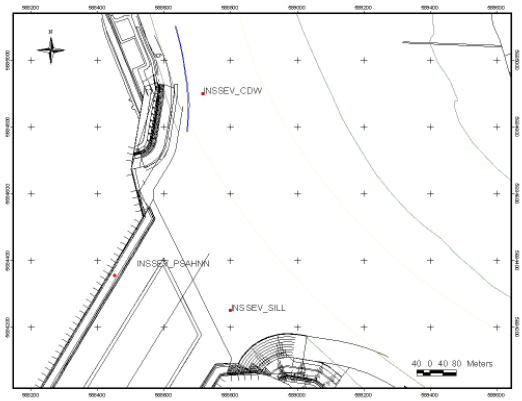

Figure 3-15: Settling velocity (INSSEV) 05/09/2006 – 07/09/2006

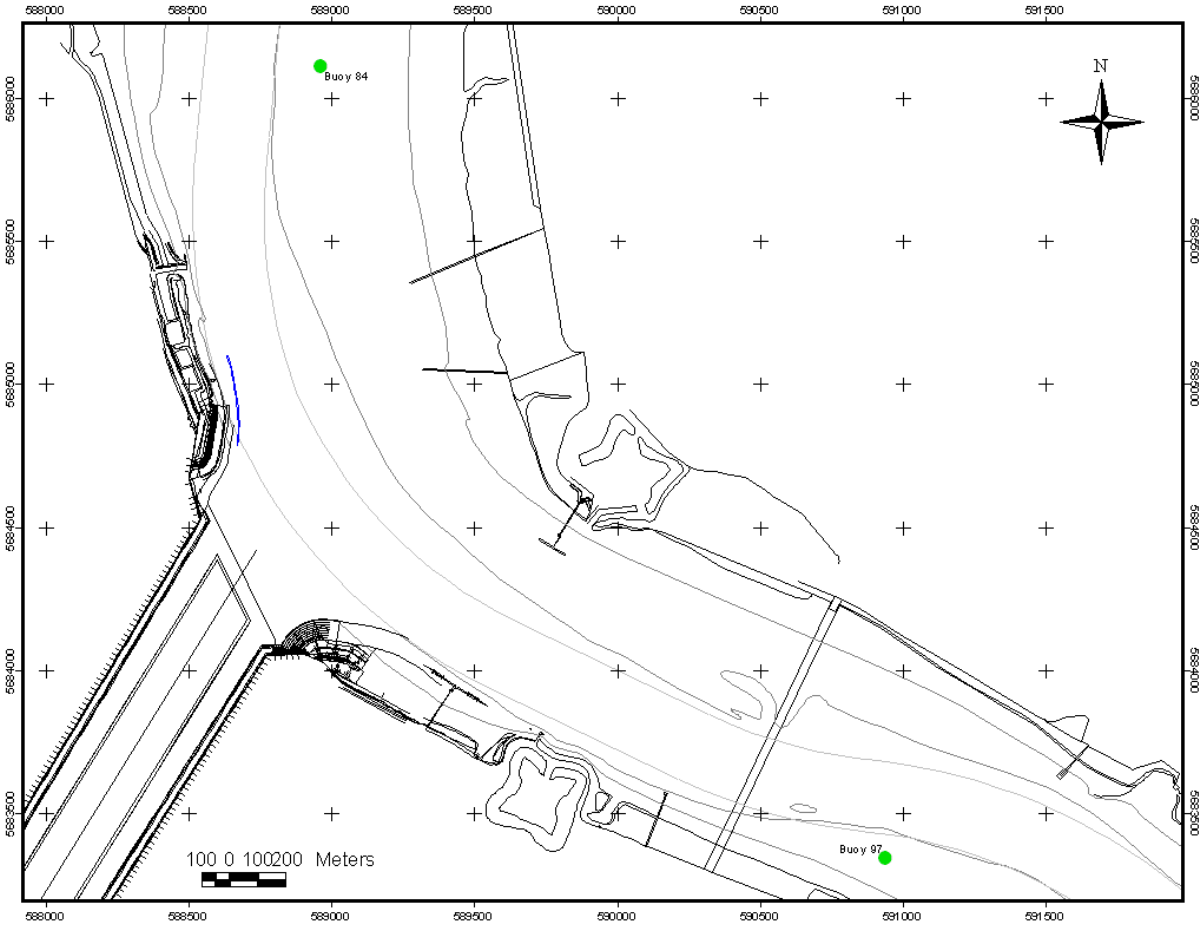

Figure 3-16: Long term measurements in the Lower Sea Scheldt

3.2. Description of the data

3.2.1. Parameters and equipment

The data gathered during the measurement campaign is current velocity, current direction, temperature, pressure and turbidity. For the through tide measurements also data about depth and position of the hard and soft bottom is collected. To report the results in most cases current velocity, current direction, temperature, salinity and suspended sediment concentration is used.

A detailed description of the data acquisition can be found in IMDC (2006b – 2006l; 2007a-2007q).

During the long term stationary at buoy 97 and buoy 84 measurements current, temperature, salinity and turbidity where measured using Aanderaa RCM-9's. A fixed set up was used in which a steel frame was placed on the bottom, with two RCM-9s suspended and held upright by subsurface buoys (Figure 3-17). The lower RCM-9 was placed at 0.80 m above the bottom, while the upper one was placed at a distance of 2.5 m above the lower one. To collect data, check and clean the instruments the instruments were surfaced on regular bases.
The owner of the instruments differs per location, the measurement instruments on buoy 84 belong to WL – Cel Hydrometrie Schelde and the instruments on buoy 97 to IMDC.

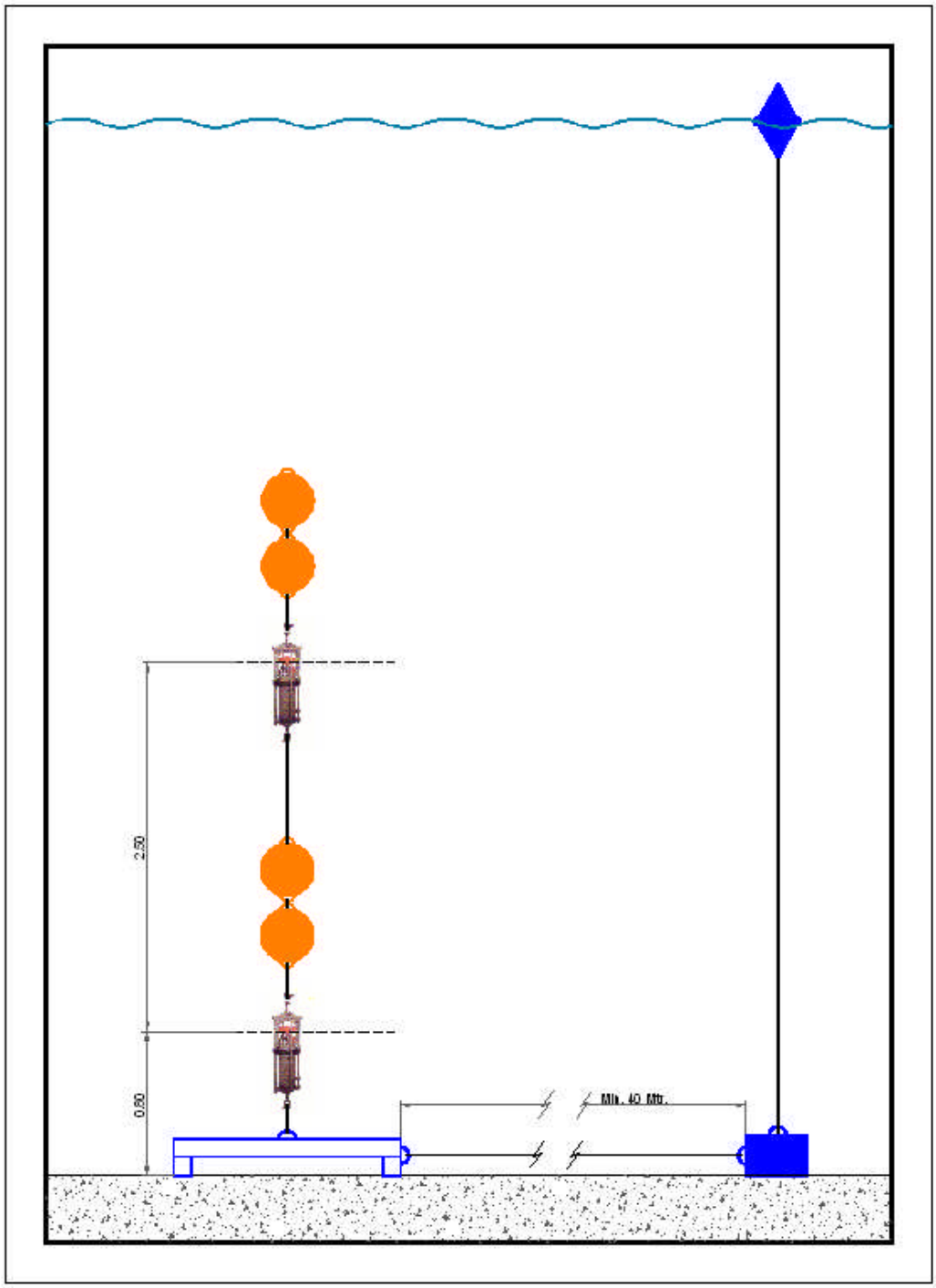

Figure 3-17: Fixed set-up for two RCM9 units with subsurface buoys (orange)

The instruments were set up to measure every 10 minutes. All sensors (temperature, pressure, conductivity, turbidity, tilting) except the Doppler Current Sensor were set to record once every 10 minutes. The Doppler Current Sensor sent 600 pings during every 10 minute-interval and calculated the average value for current speed and direction over this interval. Data storage units

in the instruments logged all the measured values. A picture of the set-up is shown in Figure 3-18. More information about the Aanderaa RCM-9 can be found in IMDC (2005l).

Figure 3-18: Set-up of two RCM-9 units

Table 3-2 gives an overview of the measured parameters during the long term measurements and the depth at which these were registered.

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Table 3-2: The equipment and measured parameters per location (01/01/2006 – 31/03/2008)

Through tide measurements									
Location	***Period***	***Instrument***	***Velocity***	***Direction***	***Temperature***	***Pressure***	***Conductivity***	***Turbidity***	***Depth***
Deurganckdok (in dock, transect Y	21/03/06, 26/09/06 & 12/03/08	SiltProfiler			X	X	X	X	
		Echosounder							X
		Aanderaa RCM 9			X	X	X		
		CTD			X	X	X		
Liefkenshoek (transect I)	22/03/06, 27/09/06 & 11/03/08	ADCP	X	X					
		OBS			X	X	X	X	
		CTD			X	X	X		
		Pump Sampler							
		SiltProfiler			X	X	X	X	
		Echosounder							X
Deurganckdok (transect DGD)	22/03/06, 27/09/06 & 11/03/08	ADCP	X	X					
		OBS			X	X	X	X	
		CTD			X	X	X		
		Pump Sampler							
Deurganckdok (transect K)	22/03/06, 27/09/06 & 11/03/08	ADCP	X	X					
		OBS			X	X	X	X	
		CTD			X	X	X		
		Pump Sampler							
	23/03/06 & 28/09/06	SiltProfiler			X	X	X	X	
		Echosounder							X
Schelle (transect S)	23/03/06 & 28/09/06	ADCP	X	X					
		OBS			X	X	X	X	
		CTD			X	X	X		
		Pump Sampler							
Waarde (Transect W)	23/03/06 & 28/09/06	Same as Schelle (transect S)							

Near bed continuous monitoring									
Location	***Period***	***Instrument***	***Velocity***	***Direction***	***Temperature***	***Pressure***	***Conductivity***	***Turbidity***	***Depth***
Deurganckdok CDW	14/03/2006 – 05/04/2006	Valeport MIDAS OBS3+	X	X	X	X	X	X	
		Aanderaa RCM9	X	X	X	X	X	X	
		ALTUS							X
		ARGUS			X	X	X	X	
Deurganckdok CDW	19/04/2006 – 23/05/2006	Idem	Idem						
Deurganckdok Sill	19/04/2006 – 23/05/2006	Idem	Idem						
Deurganckdok CDW	18/07/2006 – 11/10/2006	Idem	Idem						
Deurganckdok Sill	19/07/2006 – 11/10/2006	Idem	Idem						
Deurganckdok CDW	15/03/2007 – 12/04/2007	Idem	Idem						
Deurganckdok Sill	09/02/2007 – 18/04/2007	Idem	Idem						
Deurganckdok CDW	26/09/2007 – 05/12/2007	Idem	Idem						
Deurganckdok Sill	10/10/2007 – 28/11/2007	Idem	Idem						
Deurganckdok CDW	20/02/2008 – 02/04/2008	Idem	Idem						
Deurganckdok Sill	27/02/2008 – 09/04/2008	Idem	Idem						

Long-term salinity measurements								
Location	***Period***	***Instrument***	***Velocity***	***Direction***	***Temperature***	***Pressure***	***Conductivity***	***Turbidity***
Deurganckdok (Quay wall)	17/03/2006 – 28/04/2006	Aanderaa RCM9	X	X	X	X	X	X
		OBS 3A			X	X	X	X
Deurganckdok (Quay wall)	20/07/2006 – 12/10/2006	OBS 3A			X	X	X	X
Deurganckdok (Quay wall)	12/02/2007 – 27/03/2007	OBS 3A			X	X	X	X
Deurganckdok (Quay wall)	20/06/2007 – 31/07/2007	OBS 3A			X	X	X	X
Deurganckdok (Quay wall)	19/09/2007 – 10/12/2007	OBS 3A			X	X	X	X
Deurganckdok (Quay wall)	20/02/2008 – 28/04/2008	OBS 3A			X	X	X	X

Long-term measurements			
Location	***Period***	***Instrument***	***Depth sensor***
Buoy 84	01/01/2006 – 30/06/2006	Aanderaa RCM 9	-5.6m TAW
		Aanderaa RCM 9	-8.1m TAW
Buoy 97	01/01/2006 – 30/06/2006	Aanderaa RCM 9	-5.3m TAW
		Aanderaa RCM 9	-7.8m TAW
Buoy 84	01/07/2006 – 31/12/2006	Aanderaa RCM 9	-5.6m TAW
		Aanderaa RCM 9	-8.1m TAW
Buoy 97	01/07/2006 – 31/12/2006	Aanderaa RCM 9	-5.3m TAW
		Aanderaa RCM 9	-7.8m TAW
Buoy 84	01/01/2007 – 31/03/2007	Aanderaa RCM 9	-5.6m TAW
		Aanderaa RCM 9	-8.1m TAW
Buoy 97	01/01/2007 – 31/03/2007	Aanderaa RCM 9	-5.3m TAW
		Aanderaa RCM 9	-7.8m TAW
Buoy 84	01/04/2007 – 30/06/2007	Aanderaa RCM 9	-5.6m TAW
		Aanderaa RCM 9	-8.1m TAW
Buoy 97	01/04/2007 – 30/06/2007	Aanderaa RCM 9	-5.3m TAW
		Aanderaa RCM 9	-7.8m TAW
Buoy 84	01/07/2007 – 30/09/2007	Aanderaa RCM 9	-5.6m TAW
		Aanderaa RCM 9	-8.1m TAW
Buoy 97	01/07/2007 – 30/09/2007	Aanderaa RCM 9	-5.3m TAW
		Aanderaa RCM 9	-7.8m TAW
Buoy 84	01/10/2007 – 31/12/2007	Aanderaa RCM 9	-5.6m TAW
		Aanderaa RCM 9	-8.1m TAW
Buoy 97	01/10/2007 – 31/12/2007	Aanderaa RCM 9	-5.3m TAW
		Aanderaa RCM 9	-7.8m TAW

Long-term measurements			
Location	***Period***	***Instrument***	***Depth sensor***
Buoy 84	01/01/2008 – 31/03/2008	Aanderaa RCM 9	-5.6m TAW
		Aanderaa RCM 9	-8.1m TAW
Buoy 97	01/01/2008 – 31/03/2008	Aanderaa RCM 9	-5.3m TAW
		Aanderaa RCM 9	-7.8m TAW

3.2.2. Overview of the data acquisition (measurements buoy 84 & buoy 97)

A chronological overview of the measurements, per location and per instrument, is given in Table 3-3 as well as an explanation for missing and faulty data.

Table 3-3: Chronological overview of the RCM-9 measurements

Buoy 84 top – 3.3 m above bottom				
Period	***Sensor***	***No data***	***Faulty data***	***Comment***
20/09/2005				Start measurement period
01/01/2008	0579			Start reporting period
30/01/2008 – 06/02/2008		X		Out for calibration
31/03/2008	0579			End reporting period
Buoy 84 bottom – 0.8 m above bottom				
Period	***Sensor***	***No data***	***Faulty data***	***Comment***
20/09/2005				Start measurement period
01/01/2008	1153			Start reporting period
05/12/2007 – 11/01/2008	1153		X	Bad conductivity data
11/01/2008 – 30/01/2008	1153	X		Bad battery connection
30/01/2008 – 06/02/2008	1153	X		Out for calibration
06/02/2008 – 25/02/2008	248	X		Bad battery connection
25/02/2008 – 20/03/2008	248		X	Bad turbidity data
31/03/2008	248			End reporting period
Buoy 97 top – 3.3 m above bottom				
Period	***Sensor***	***No data***	***Faulty data***	***Comment***
21/09/2005				Start measurement period
01/01/2008	1220			Start reporting period
30/01/2008 – 27/02/2008	1166			1220 out for calibration
27/02/2008	1220			Restart with calibrated RCM9
31/03/2008	1220			End reporting period

Buoy 97 bottom – 0.8 m above bottom				
Period	***Sensor***	***No data***	***Faulty data***	***Comment***
21/09/2005				Start measurement period
01/01/2008	1229			Start reporting period
30/01/2008 – 27/02/2008	1169			1229 out for calibration
27/02/2008	1229			Restart with calibrated RCM9
31/03/2008	1229			End reporting period

3.3. Processing of datasets

3.3.1. Methodology of Processing

The collected data was validated and outliers were removed. Erroneous measurements because of malfunction of sensors, growth on sensors, instrument failure were also removed from the dataset and are documented in 3.2.2.

Salinity was calculated using the temperature, conductivity and pressure in the pps-78 formula (Unesco, 1991 & IMDC, 2002).

Turbidity values were converted to suspended sediment concentration using the equation of the calibration curve. By submerging each turbidity sensor in clean water at almost every redeployment, the bias of the turbidity sensors was tested.

The calibration procedure and calibration graphs can be found in IMDC (2006a, 2007a, 2008f and 2008o).

3.3.2. Results (weekly)

Measurements are visualized per instrument, location and per week in APPENDIX B.

- The title shows the week number followed by the year
- The first graph shows the current velocity and the current direction. The direction is scaled from 0 to 360
- The second graph depicts the salinity and temperature
- The third and last graph shows the waterlevel at the nearest tidal gauge and the suspended sediment concentration

All times are given in MET.

3.3.3. Results (monthly)

Monthly results are reported in APPENDIX B. The minimum, maximum and average value for velocity magnitude, temperature and suspended sediment concentration is given for every month. For salinity the minimum, maximum and mean are calculated for both high water slack and low water slack.

3.3.4. Results (deployment period)

An overview of the evolution of the monthly minimum, maximum and average values for velocity magnitude, temperature and suspended sediment concentration is given in APPENDIX B. For

salinity the minimum, maximum and mean are given for both high water slack and low water slack. The graphs are given for the whole deployment period (September 2005 – March 2008).

3.3.5. Total results (January 2008 – March 2008)

The results for the whole deployment period are also given in APPENDIX B. The minimum, maximum and average value for velocity magnitude, temperature and suspended sediment concentration is given for the period from January 2008 till March 2008. For salinity the minimum, maximum and mean are calculated for both high water slack and low water slack is given.

4. AMBIENT CONDITIONS

4.1. Environmental characteristics in the Lower Sea Scheldt

4.1.1. Other measurement campaigns

Beside the RCM-9 measurements at buoy 97 and 84 also other long-term measurements were executed in the Lower Sea Scheldt. At Oosterweel left bank (or Dukdalf), current, temperature, salinity and turbidity measurements were conducted using 2 Aanderaa RCM-9 units. Another RCM-9 unit was also used at Prosperpolder, where only temperature and salinity measurements were conducted. These instruments were suspended from a mooring post at fixed distances from the bottom. These measurements were set up and maintained by WL – Cel Hydrometrie Schelde. Figure 4-1 shows an overview of all the measurement locations (including locations of HCBS2 measurements).

The data of these measurements was processed by IMDC and is presented in APPENDIX C. Calibration of the turbidity sensors was executed by IMDC during the summer calibration of 2006 and winter calibration of 2008. Further details of this calibration can be found in IMDC (2007a and 2008o).

Table 4-1: Measurement locations and periods at Oosterweel (left bank) & Prosperpolder .

Location	***Depth sensor***	***Easting (UTM ED 50)***	***Northing (UTM ED 50)***	***Period***
Oosterweel (left bank)	4.5m above bottom (-2.3m TAW)	595574	5677278	01/01/2008 – 31/03/2008
Oosterweel (left bank)	1m above bottom (-5.8m TAW)	595574	5677278	01/01/2008 – 31/03/2008
Prosperpolder	2.5m above bottom (-1.5m TAW)	586307	5689501	01/01/2008– 31/03/2008

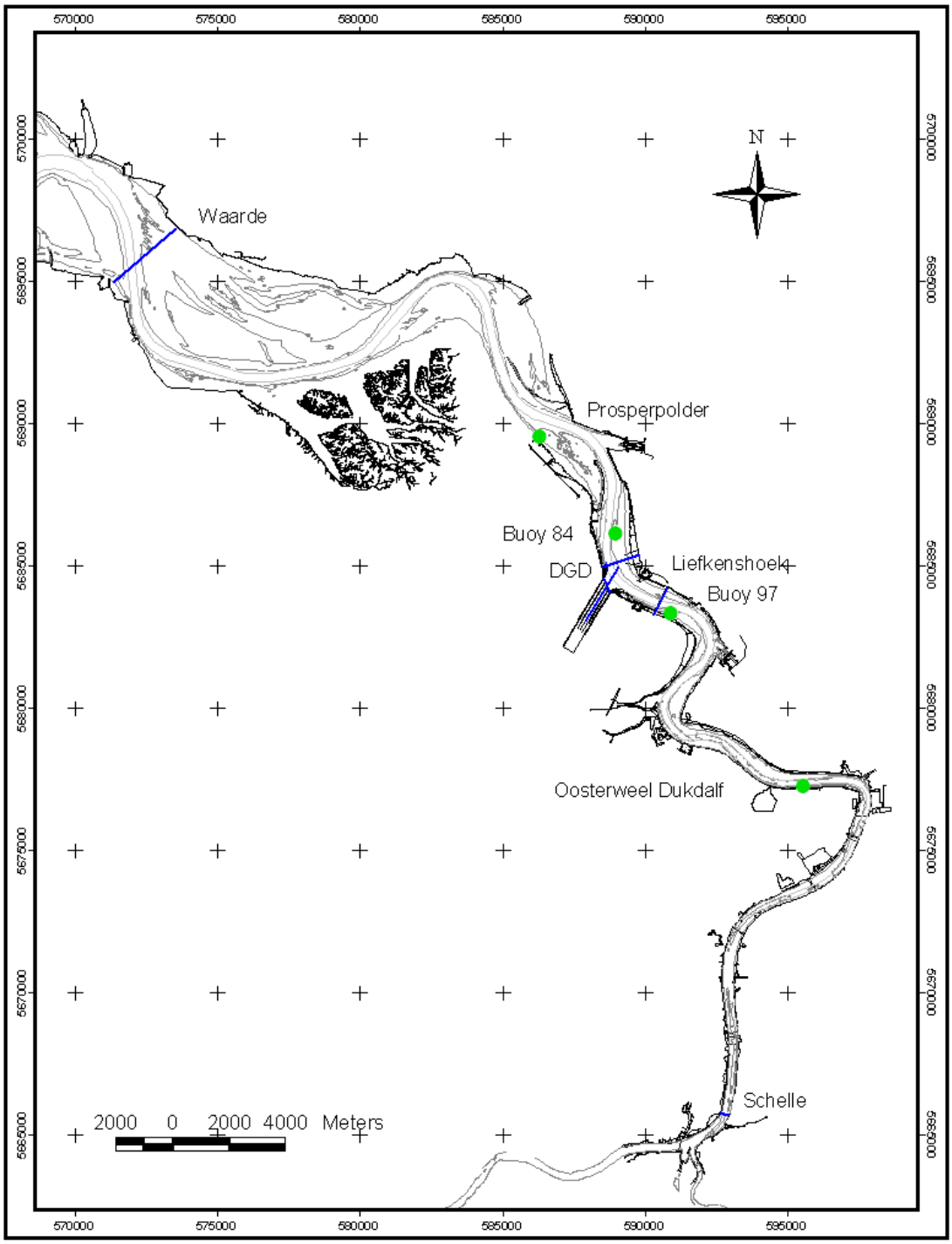


Figure 4-1: All measurement locations 01/2007 – 03/2008

The data gathered during these long-term measurements is current velocity, current direction, temperature, pressure and turbidity. In APPENDIX C the processed data is visualized per instrument, location and per week for January until March 2008.

- The title shows the week number followed by the year
- The first graph shows the current velocity and the current direction. The direction is scaled from 0 to 360.
- The second graph depicts the salinity and temperature
- The third and last graph shows the water level at the nearest tidal gauge and the suspended sediment concentration

All times are given in MET.

To convert the turbidity values to suspended sediment concentration the equation of the calibration curve was used. The calibration procedure and calibration graphs can be found in IMDC (2007a and 2008o).

An overview of the measurements and an explanation of missing and faulty data for the whole period is given in Table 4-2.

Table 4-2: Chronological overview of the long-term measurements at Oosterweel & Prosperpolder (01/01/2008 - 31/03/2008)

Oosterweel left bank – 4.5 m above bottom				
Period	***Sensor***	***No data***	***Faulty data***	***Comment***
01/07/2004				Start measurement period
01/01/2008	0152			Start reporting period
30/01/2008 – 06/02/2008	0152	X		Data not delivered
26/02/2008 – 28/02/2008	0152	X		No tidal data
14/03/2008 – 31/03/2008	0152		X	Bad turbidity data
31/03/2008	0152			End reporting period
Oosterweel left bank – 1 m above bottom				
Period	***Sensor***	***No data***	***Faulty data***	***Comment***
01/07/2004				Start measurement period
01/01/2008	0149			Start reporting period
30/01/2008 – 06/02/2008	0149	X		Data not delivered
26/02/2008 – 28/02/2008	0149	X		No tidal data
16/03/2008 – 31/03/2008	0149		X	Bad turbidity data
31/03/2008	0149			End reporting period

Prosperpolder – 2.5 m above bottom				
Period	***Sensor***	***No data***	***Faulty data***	***Comment***
15/06/2006	0117			Start measurement period
01/01/2008	0117			Start reporting period
01/01/2008 – 09/01/2008	0117	X		Data not delivered
26/02/2008 – 28/02/2008	0149	X		No tidal data
31/03/2008	0117			End reporting period

Monthly results (minimum, maximum and average) are shown in APPENDIX C. The minimum, maximum and average value for velocity magnitude, temperature and suspended sediment concentration is given for every month. For salinity the minimum, maximum and mean are calculated for both high water slack and low water slack. Also an overview of the evolution of the monthly minimum, maximum and average values of these parameters is given in APPENDIX C for the whole measurement period. Notice that for the suspended sediment concentration the graphs are only given since 2006.

The results for the whole reporting period are also given in APPENDIX C. The minimum, maximum and average value for velocity magnitude, temperature and suspended sediment concentration is given for the period from January till March 2008. For salinity the minimum, maximum and mean are calculated for both high water slack and low water slack is given.

4.1.2. Vertical tide

Tidal data was delivered for the period from 01/01/2008 till 31/03/2008 by Waterbouwkundig Laboratorium – Cel Hydrometrie Schelde. It is reported together with the processed data of the long-term measurement campaigns and those at Oosterweel and Prosperpolder in APPENDIX B respectively APPENDIX C.

4.1.3. Salinity downstream

Salinity data of Baalhoek and Hoofdplaat was collected from the Hydro Meteo Centrum Zeeland (HMCZ, 2008) and processed by IMDC. Outliers were screened and removed. Monthly results (minimum, maximum and average values for salinity) are reported in APPENDIX D.

4.2. Fresh water inflow from the tributaries

The fresh water discharge of the Kleine Nete (Grobbendonk), the Grote Nete (Hulshout), the Dijle (Wijgmaal), The Demer (Wilsele), the Dender (Dendermonde), the Zenne (Eppegem) and the Bovenschelde (Melle) are provided by the Hydrologische Informatie Centrum of the Ministerie van de Vlaamse Gemeenschap – Departement Leefmilieu en Infrastructuur Afdeling Waterbouwkundig Laboratorium. The gauging stations are not influenced by the tide. The calculated discharges at the gauging stations are converted to discharges at the mouth of the tributaries and then to a total fresh water discharge at Schelle. This procedure is described in AZ (1974) and is based on the use of correction coefficients that take in account the surface of the hydrological basins.

In APPENDIX E a graph of the evolution of the fresh water discharge is given just as a table with the decade averages of the fresh water discharge. Also the monthly averages are compared to the

expected discharges in a graph. Notice that the given values are only temporary since no influence of possible growth is taken in to account yet. This will be done at the end of the year by the Hydrologische Informatie Centrum of the Ministerie van Mobiliteit en Openbare Werken - Departement Mobiliteit en Openbare Werken - Afdeling Waterbouwkundig Laboratorium.

4.3. Meteorological data

The meteorological conditions for the measurement station Deurne for the period 01/01/2008 - 31/03/2008 cannot be reported. This data should have been obtained from the KMI (Royal Meteorological Institute of Belgium) but due to problems at the institute the requested data is not published yet. Therefore the meteorological data of Woensdrecht (NL) has been used, obtained from the Weather underground website (Wunderground 2008).

During the 3 winter months there was an average air temperature of 5°C with minimum and maximum of –8°C and 15°C respectively and with average minimum and average maximum of 2 and 8°C respectively. In general wind blew with a speed of 16 km/h and gusts until 89 km/h. It rained often in January and in March but no quantities have been given.

4.4. Human Activities

4.4.1. Dredging activities

Afdeling Maritieme Toegang provided information about the dates, times, volumes and locations of dredging activities. In APPENDIX F an overview is given of all the dredging activities from 01/01/2008 till 31/03/2008. Weekly volumes are given per location.

4.4.2. Navigation

Weekly data of navigation was delivered by Afdeling Scheepvaartbegeleiding – Schelde Rader Keten for the period of 01/01/2008 till 31/03/2008. To order the data a splitting up of the Beneden Zeeschelde was done in 4 areas. The first area is from de Belgian border up to locks of Zandvliet – Berendrecht (sluizencomplex Zandvliet – Berendrecht), the second goes from this point forward up to Deurganckdok. The third area is from Deurganckdok up to the lock of Kallo (Kallosluis) and finally the fourth goes up to the lock of Royers (Royerssluis). A more detailed description of the areas can be found in APPENDIX G. Also a distinction is made between the draughts. In APPENDIX G a total number is given which refers to the total of passing ships registered by Afdeling Scheepvaartbegeleiding - Schelde Radar Keten. In addition a difference was made between inland navigation and seagoing ships, just as between arrival and departure. Notice that for a certain area and certain draught, the total may deviate from the sum of inland navigation and seagoing. This can be explained by the presence of ships like dredgers, which were only counted in the column ‘total’. Also a difference may occur between the total number and the sum of the arrival and departure number. This is due to vessels that have the same entry and exit point.

Finally it should be mentioned that not all inland shipping is observed by the system, which means that the actual number of inland shipping will be higher.

5. REFERENCES

AZ (1974). Debieten van het Scheldebekken periode 1959 – 1972. *Ministerie van Openbare werken, Antwerpse Zeehavendienst.*

HMCZ (2008). Hydro Meteo Centrum Zeeland. Tijdsreeksen uit de WTZ – database. Consulted on 26 May 2008, at http://www.hmcz.nl.

Wunderground (2008). Weather Underground: www.wunderground.com

IMDC (2002). Studie Densiteitsstroming in het kader van LTV Schelde, Stroom- en saliniteitsmeting t.h.v. Deurganckdok uitgevoerd op 12/06/202, I/RA/11216/02.042/CMA.

IMDC (2005a). Uitbreiding studie densiteitsstromingen in de Beneden Zeeschelde in het kader van LTV Meetcampagne naar hooggeconcentreerde slibsuspensies Deelrapport 1: Test survey 17/02/2005, I/RA/11265/05.008/MSA.

IMDC (2005b). Uitbreiding studie densiteitsstromingen in de Beneden Zeeschelde in het kader van LTV Meetcampagne naar hooggeconcentreerde slibsuspensies Deelrapport 2.1: Deurganckdok 17/02/2005, I/RA/11265/05.009/MSA.

IMDC (2005c). Uitbreiding studie densiteitsstromingen in de Beneden Zeeschelde in het kader van LTV Meetcampagne naar hooggeconcentreerde slibsuspensies Deelrapport 2.2: Zandvliet 17/02/2005, I/RA/11265/05.010/MSA.

IMDC (2005d). Uitbreiding studie densiteitsstromingen in de Beneden Zeeschelde in het kader van LTV Meetcampagne naar hooggeconcentreerde slibsuspensies Deelrapport 2.3: Liefkenshoek 17/02/2005, I/RA/11265/05.0011/MSA.

IMDC (2005e). Uitbreiding studie densiteitsstromingen in de Beneden Zeeschelde in het kader van LTV Meetcampagne naar hooggeconcentreerde slibsuspensies Deelrapport 2.4: Schelle 17/02/2005, I/RA/11265/05.0012/MSA.

IMDC (2005f). Uitbreiding studie densiteitsstromingen in de Beneden Zeeschelde in het kader van LTV Meetcampagne naar hooggeconcentreerde slibsuspensies Deelrapport 2.5: Deurganckdok 16/02/2005, I/RA/11265/05.013/MSA.

IMDC (2005g). Uitbreiding studie densiteitsstromingen in de Beneden Zeeschelde in het kader van LTV Meetcampagne naar hooggeconcentreerde slibsuspensies Deelrapport 2.6: Kallosluis 18/02/2005, I/RA/11265/05.014/MSA.

IMDC (2005h). Uitbreiding studie densiteitsstromingen in de Beneden Zeeschelde in het kader van LTV Meetcampagne naar hooggeconcentreerde slibsuspensies Deelrapport 2.7: Near bed continious monitoring: february 2005, I/RA/11265/05.015/MSA.

IMDC (2005i). Uitbreiding studie densiteitsstromingen in de Beneden Zeeschelde in het kader van LTV Meetcampagne naar hooggeconcentreerde slibsuspensies Deelrapport 3: Settling velocity INSSEV february 2005, I/RA/11265/05.016/MSA.

IMDC (2005j). Uitbreiding studie densiteitsstromingen in de Beneden Zeeschelde in het kader van LTV Meetcampagne naar hooggeconcentreerde slibsuspensies Deelrapport 4: Cohesive sediment properties february 2005, I/RA/11265/05.017/MSA

IMDC (2005k). Uitbreiding studie densiteitsstromingen in de Beneden Zeeschelde in het kader van LTV Meetcampagne naar hooggeconcentreerde slibsuspensies Deelrapport 5.1: Overview of ambient conditions in the river Scheldt January-June 2005, I/RA/11265/05.018/MSA.

IMDC (2005l). Uitbreiding studie densiteitsstromingen in de Beneden Zeeschelde in het kader van LTV Meetcampagne naar hooggeconcentreerde slibsuspensies Deelrapport 5.2: Overview of ambient conditions in the river Scheldt July-December 2005, I/RA/11265/05.019/MSA.

IMDC (2006a) Uitbreiding studie densiteitsstromingen in de Beneden Zeeschelde in het kader van LTV Meetcampagne naar hooggeconcentreerde slibsuspensies Deelrapport 6.1 Calibration Winter 15 March & 14 April 2006? I/RA/11291/06.092/MSA.

IMDC (2006b) Uitbreiding studie densiteitsstromingen in de Beneden Zeeschelde in het kader van LTV Meetcampagne naar hooggeconcentreerde slibsuspensies Deelrapport 7.1 21 March 2006 Scheldewacht – Deurganckdok, I/RA/11291/06.094/MSA.

IMDC (2006c) Uitbreiding studie densiteitsstromingen in de Beneden Zeeschelde in het kader van LTV Meetcampagne naar hooggeconcentreerde slibsuspensies Deelrapport 7.2 22 March 2006 Parel 2 – Deurganckdok (downstream), I/RA/11291/06.095/MSA.

IMDC (2006d) Uitbreiding studie densiteitsstromingen in de Beneden Zeeschelde in het kader van LTV Meetcampagne naar hooggeconcentreerde slibsuspensies Deelrapport 7.3 22 March 2006 Laure Marie – Liefkenshoek, I/RA/11291/06.096/MSA.

IMDC (2006e) Uitbreiding studie densiteitsstromingen in de Beneden Zeeschelde in het kader van LTV Meetcampagne naar hooggeconcentreerde slibsuspensies Deelrapport 7.4 23 March 2006 Parel 2 – Schelle, I/RA/11291/06.097/MSA.

IMDC (2006f) Uitbreiding studie densiteitsstromingen in de Beneden Zeeschelde in het kader van LTV Meetcampagne naar hooggeconcentreerde slibsuspensies Deelrapport 7.5 23 March 2006 Laure Marie – Deurganckdok (downstream), I/RA/11291/06.098/MSA.

IMDC (2006g) Uitbreiding studie densiteitsstromingen in de Beneden Zeeschelde in het kader van LTV Meetcampagne naar hooggeconcentreerde slibsuspensies Deelrapport 7.6 23 March 2006 Veremans – Waarde, I/RA/11291/06.099/MSA.

IMDC(2006h) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.1 Opmeting stroming en zout- en sedimentbeweging aan de ingang van het Deurganckdok (SiltProfiler), I/RA/11283/06.087/WGO.

IMDC(2006i) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.3. Opmeting stroming en zout-en sedimentbeweging aan de ingang van het Deurganckdok (ADCP), I/RA/11283/06.110/BDC

IMDC (2006j). Uitbreiding studie densiteitsstromingen in de Beneden Zeeschelde in het kader van LTV Meetcampagne naar hooggeconcentreerde slibsuspensies Deelrapport 8.1: Vaste meetopstelling in zake bodemgedrag, I/RA/11291/06.100/MSA.

IMDC (2006k) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.6 Zout en slibverdeling Deurganckdok 17/03/2006 – 23/05/2006, I/RA/11283/06.121/MSA.

IMDC (2006l) Uitbreiding studie densiteitsstromingen in de Beneden Zeeschelde in het kader van LTV Meetcampagne naar hooggeconcentreerde slibsuspensies Deelrapport 5.3 Overview of ambient conditions in the river Scheldt – Januari-June 2006 (I/RA/11291/06.089/MSA), in opdracht van AWZ.

IMDC(2006m): Studie van de stromingsvelden en sedimentuitwisseling aan de ingang van Deurganckdok. Current and Sediment flux measurements November 17th 2005 (I/RA/15030/06.021/BDC).

IMDC (2006n). Uitbreiding studie densiteitsstromingen in de Beneden Zeeschelde in het kader van LTV Meetcampagne naar hooggeconcentreerde slibsuspensies Deelrapport 9: Valsnelheid slib – INSSEV, I/RA/11291/06.102/MSA, in opdracht van AWZ.

IMDC (2006o). Uitbreiding studie densiteitsstromingen in de Beneden Zeeschelde in het kader van LTV Meetcampagne naar hooggeconcentreerde slibsuspensies Deelrapport 2.7: Silt distribution and frame measurements 15/07/2006 – 31/10/2006. (I/RA/11291/06.122/MSA).

IMDC (2006p) Uitbreiding studie densiteitsstromingen in de Beneden Zeeschelde in het kader van LTV Meetcampagne naar hooggeconcentreerde slibsuspensies Deelrapport 5.3 Overview of ambient conditions in the river Scheldt – Januari-June 2006 (I/RA/11291/06.089/MSA), in opdracht van AWZ.

IMDC (2007a) Uitbreiding studie densiteitsstromingen in de Beneden Zeeschelde in het kader van LTV Meetcampagne naar hooggeconcentreerde slibsuspensies Deelrapport 6.2 Summer calibration and Final report, I/RA/11291/06.093/MSA.

IMDC (2007b). Uitbreiding studie densiteitsstromingen in de Beneden Zeeschelde in het kader van LTV Meetcampagne naar hooggeconcentreerde slibsuspensies Deelrapport 5.4 Overview of ambient conditions in the river Scheldt – July-December 2006 (I/RA/11291/06.089/MSA), in opdracht van AWZ.

IMDC (2007c). Uitbreiding studie densiteitsstromingen in de Beneden Zeeschelde in het kader van LTV Meetcampagne naar hooggeconcentreerde slibsuspensies Deelrapport 11.1 Through tide Measurement Sediview & Siltprofiler 27/9 Stream - Liefkenshoek (I/RA/11291/06.104/MSA), in opdracht van AWZ.

IMDC (2007d). Uitbreiding studie densiteitsstromingen in de Beneden Zeeschelde in het kader van LTV Meetcampagne naar hooggeconcentreerde slibsuspensies Deelrapport 11.2 Through tide Measurement Sediview 27/9 Veremans - Raai K (I/RA/11291/06.105/MSA), in opdracht van AWZ.

IMDC (2007e). Uitbreiding studie densiteitsstromingen in de Beneden Zeeschelde in het kader van LTV Meetcampagne naar hooggeconcentreerde slibsuspensies Deelrapport 11.3 Through tide Measurement Sediview & Siltprofiler 28/9 Stream - Raai K (I/RA/11291/06.106/MSA), in opdracht van AWZ.

IMDC (2007f). Uitbreiding studie densiteitsstromingen in de Beneden Zeeschelde in het kader van LTV Meetcampagne naar hooggeconcentreerde slibsuspensies Deelrapport 11.4 Through tide Measurement Sediview 28/9 Veremans - Waarde(I/RA/11291/06.107/MSA), in opdracht van AWZ.

IMDC (2007g). Uitbreiding studie densiteitsstromingen in de Beneden Zeeschelde in het kader van LTV Meetcampagne naar hooggeconcentreerde slibsuspensies Deelrapport 11.5 Through tide Measurement Sediview 28/9 Parel 2 - Schelle (I/RA/11291/06.108/MSA), in opdracht van AWZ.

IMDC (2007h). Uitbreiding studie densiteitsstromingen in de Beneden Zeeschelde in het kader van LTV Meetcampagne naar hooggeconcentreerde slibsuspensies Deelrapport 11.6 Through tide Measurement Salinity Distribution 26/9 Scheldewacht – Deurganckdok in opdracht van AWZ.

IMDC (2007i) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 1.1 Sediment Balance: Three monthly report 1/4/2006 – 30/06/2006 (I/RA/11283/06.113/MSA)

IMDC (2007j) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 1.2 Sediment Balance: Three monthly report 1/7/2006 – 30/09/2006 (I/RA/11283/06.114/MSA)

IMDC (2007k) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 1.3 Sediment Balance: Three monthly report 1/10/2006 – 31/12/2006 (I/RA/11283/06.115/MSA)

IMDC (2007l) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 1.4 Sediment Balance: Three monthly report 1/1/2007 – 31/03/2007 (I/RA/11283/06.116/MSA)

IMDC (2007m) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 1.5 Annual Sediment Balance (I/RA/11283/06.117/MSA)

IMDC (2007n) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.2 Through tide measurement SiltProfiler 26/09/2006 Stream (I/RA/11283/06.068/MSA)

IMDC (2007o) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.7 Salt-Silt distribution & Frame Measurements Deurganckdok 15/07/2006 – 31/10/2006 (I/RA/11283/06.122/MSA)

IMDC (2007p) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.8 Salt-Silt distribution & Frame Measurements Deurganckdok 15/01/2007 – 15/03/2007 (I/RA/11283/06.123/MSA)

IMDC (2007q) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 3.1 Boundary conditions: Three monthly report 1/1/2007 – 31/03/2007 (I/RA/11283/06.127/MSA)

IMDC (2007r) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing 2. Deelrapport 1.10: Sediment Balance: Three monthly report 1/4/2007 – 30/06/2007 (I/RA/11283/07.081/MSA)

IMDC (2007s) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing 2. Deelrapport 1.11: Sediment Balance: Three monthly report 1/7/2007 – 30/09/2007 (I/RA/11283/07.082/MSA)

IMDC (2007t) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing 2. Deelrapport 2.16: Salt-Silt distribution Deurganckdok summer (21/6/2007 – 30/07/2007) (I/RA/11283/07.092/MSA)

IMDC (2007v) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing 2. Deelrapport 3.10: Boundary conditions: Three monthly report 1/04/2007 – 30/06/2007 (I/RA/11283/07.097/MSA)

IMDC (2007w) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing 2. Deelrapport 3.11: Boundary conditions: Three monthly report 1/07/2007 – 30/09/2007 (I/RA/11283/07.098/MSA)

IMDC (2008a) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.5: Through tide measurement Sediview average tide 24/10/2007 (I/RA/11283/06.120/MSA)

IMDC (2008b) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 4.1: Analysis of siltation Processes and Factors (I/RA/11283/06.129/MSA)

IMDC (2008c) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 1.12: Sediment Balance: Four monthly report 1/9/2007 – 31/12/2007 (I/RA/11283/07.083/MSA)

IMDC (2008d) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 1.13: Sediment Balance: Four monthly report 1/01/2007 – 31/03/2007 (I/RA/11283/07.084/MSA)

IMDC (2008e) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 1.14: Annual Sediment Balance. (I/RA/11283/07.085/MSA)

IMDC (2008f) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.09: Calibration stationary equipment autumn (I/RA/11283/07.095/MSA)

IMDC (2008g) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.10: Through tide measurement SiltProfiler 23 October 2007 (I/RA/11283/07.086/MSA)

IMDC (2008h) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.11: Through tide measurement Salinity Profiling winter 12 March 2008 (I/RA/11283/07.087/MSA)

IMDC (2008i) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.12: Through tide measurement Sediview winter 11 March 2008 – Transect I (I/RA/11283/07.088/MSA)

IMDC (2008j) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.13: Through tide measurement Sediview winter 11 March 2008 – Transect K (I/RA/11283/07.089/MSA)

IMDC (2008k) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.14: Through tide measurement Sediview winter 11 March 2008 – Transect DGD (I/RA/11283/07.090/MSA)

IMDC (2008l) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.15: Through tide measurement SiltProfiler winter 12 March 2008 (I/RA/11283/07.091/MSA)

IMDC (2008m) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.17: Salt-Silt distribution & Frame Measurements Deurganckdok autumn (17/9/2007-10/12/2007) (I/RA/11283/07.093/MSA)

IMDC (2008n) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.18: Salt-Silt distribution & Frame Measurements Deurganckdok winter (18/02/2007-31/03/2008) (I/RA/11283/07.094/MSA)

IMDC (2008o) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.19: Calibration stationary & mobile equipment winter (I/RA/11283/07.096/MSA)

IMDC (2008p) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 3.12: Boundary conditions: Three monthly report 1/9/2007 – 31/12/2007 (I/RA/11283/07.099/MSA)

IMDC (2008q) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 3.13: Boundary conditions: Three monthly report 1/1/2008 – 31/3/2007 (I/RA/11283/07.100/MSA)

IMDC (2008r) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 3.14: Boundary conditions: Annual report (I/RA/11283/07.101/MSA)

IMDC (2008s) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 4.10: Analysis of siltation Processes and Factors (I/RA/11283/07.102/MSA)

TV SAM (2006a) Langdurige stationaire ADCP stroommetingen te Oosterweel dukdalf 01/2005-06/2005. 42SR S032PIB 2A.

TV SAM (2006b) Langdurige stationaire ADCP stroommetingen te Oosterweel dukdalf 07/2005-12/2005. 42SR S033PIB 2A.

TV SAM (2006c) Langdurige stationaire ADCP stroommetingen te Oosterweel dukdalf 01/2006-06/2006. 42SR S032PIB 2A.

Unesco (1983). Algorithms for computation of fundamental properties of seawater, UNESCO Technical Papers in Marine Science, 44. UNESCO, France.

APPENDIX A.

OVERVIEW OF HCBS2 AND OPVOLGING AANSLIBBING DEURGANCKDOK REPORTS

Report	Description of HCBS2
Ambient Conditions Lower Sea Scheldt	
5.3	Overview of ambient conditions in the river Scheldt – January-June 2006 (I/RA/11291/06.088/MSA)
5.4	Overview of ambient conditions in the river Scheldt – July-December 2006 (I/RA/11291/06.089/MSA)
~~5.5~~	~~Overview of ambient conditions in the river Scheldt : RCM-9 buoy 84 & 97 (1/1/2007 -31/3/2007) (I/RA/11291/06.090/MSA)~~[1]
5.6	Analysis of ambient conditions 21/09/05 - 31/3/2007 (I/RA/11291/06.091/MSA)
Calibration	
6.1	Winter Calibration (I/RA/11291/06.092/MSA)
6.2	Summer Calibration and Final Report (I/RA/11291/06.093/MSA)
Through tide Measurements Winter 2006	
7.1	21/3 Scheldewacht – Deurganckdok – Salinity Distribution (I/RA/11291/06.094/MSA)
7.2	22/3 Parel 2 – Deurganckdok (I/RA/11291/06.095/MSA)
7.3	22/3 Laure Marie – Liefkenshoek (I/RA/11291/06.096/MSA)
7.4	23/3 Parel 2 – Schelle (I/RA/11291/06.097/MSA)
7.5	23/3 Laure Marie – Deurganckdok (I/RA/11291/06.098/MSA)
7.6	23/3 Veremans Waarde (I/RA/11291/06.099/MSA)
HCBS Near bed continuous monitoring (Frames)	
8.1	Near bed continuous monitoring winter 2006 (I/RA/11291/06.100/MSA)
INSSEV	
9	Settling Velocity - INSSEV summer 2006 (I/RA/11291/06.102/MSA)
Cohesive Sediment	
10	Cohesive sediment properties summer 2006 (I/RA/11291/06.103/MSA)
Through tide Measurements Summer 2006	
11.1	Through Tide Measurement Sediview and Siltprofiler 27/9 Stream - Liefkenshoek (I/RA/11291/06.104/MSA)
11.2	Through Tide Measurement Sediview 27/9 Veremans - Raai K (I/RA/11291/06.105/MSA)
11.3	Through Tide Measurement Sediview and Siltprofiler 28/9 Stream - Raai K (I/RA/11291/06.106/MSA)
11.4	Through Tide Measurement Sediview 28/9 Veremans – Waarde (I/RA/11291/06.107/MSA)

[1] The data, foreseen for Report 5.5 is reported in report 3.1. Boundary conditions: Three monthly report 1/1/2007 – 31/03/2007 (I/RA/11283/06.127/MSA) including HCBS 2 report 5.5 (Deurganckdok).

Report	Description of HCBS2
Ambient Conditions Lower Sea Scheldt	
11.5	Through Tide Measurements Sediview 28/9 Parel 2 - Schelle (I/RA/11291/06.108/MSA)
11.6	Through Tide measurement Longitudinal Salinity Distribution 26/9 Scheldewacht – Deurganckdok (I/RA/11291/06.161/MSA)
Analysis	
12	Report concerning the presence of HCBS layers in the Scheldt river (I/RA/11291/06.109/MSA)

Report	Description of Opvolging aanslibbing Deurganckdok between April 2006 till March 2007
Sediment Balance: Bathymetry surveys, Density measurements, Maintenance and construction dredging activities	
1.1	Sediment Balance: Three monthly report 1/4/2006 – 30/06/2006 (I/RA/11283/06.113/MSA)
1.2	Sediment Balance: Three monthly report 1/7/2006 – 30/09/2006 (I/RA/11283/06.114/MSA)
1.3	Sediment Balance: Three monthly report 1/10/2006 – 31/12/2006 (I/RA/11283/06.115/MSA)
1.4	Sediment Balance: Three monthly report 1/1/2007 – 31/03/2007 (I/RA/11283/06.116/MSA)
1.5	Annual Sediment Balance (I/RA/11283/06.117/MSA)
1.6	Sediment balance Bathymetry: 2005 – 3/2006 (I/RA/11283/06.118/MSA)
Factors contributing to salt and sediment distribution in Deurganckdok: Salt-Silt (OBS3A) & Frame measurements, Through tide measurements (SiltProfiling & ADCP)	
2.1	Through tide measurement Siltprofiler 21/03/2006 Laure Marie (I/RA/11283/06.087/WGO)
2.2	Through tide measurement Siltprofiler 26/09/2006 Stream (I/RA/11283/06.068/MSA)
2.3	Through tide measurement Sediview spring tide 22/03/2006 Veremans (I/RA/11283/06.110/BDC)
2.4	Through tide measurement Sediview average tide 27/09/2006 Parel 2 (I/RA/11283/06.119/MSA)
2.5	Through tide measurement Sediview average tide (I/RA/11283/06.120/MSA)
2.6	Salt-Silt distribution & Frame Measurements Deurganckdok 13/3/2006 – 31/05/2006 (I/RA/11283/06.121/MSA)
2.7	Salt-Silt distribution & Frame Measurements Deurganckdok 15/07/2006 – 31/10/2006

Report	Description of Opvolging aanslibbing Deurganckdok between April 2006 till March 2007
	(I/RA/11283/06.122/MSA)
2.8	Salt-Silt distribution & Frame Measurements Deurganckdok 12/02/2007 – 18/04/2007 (I/RA/11283/06.123/MSA)
2.9	Calibration stationary equipment autumn (I/RA/11283/07.095/MSA)
Boundary Conditions: Upriver Discharge, Salt concentration Scheldt, Bathymetric evolution in access channels, dredging activities in Lower Sea Scheldt and access channels	
3.1	Boundary conditions: Three monthly report 1/1/2007 – 31/03/2007 (I/RA/11283/06.127/MSA) including HCBS 2 report 5.5
~~3.2~~	~~Boundary condtions: Annual report (I/RA/11283/06.128/MSA)~~[2]
Analysis	
4.1	Analysis of Siltation Processes and Factors (I/RA/11283/06.129/MSA)

[2] considered in report 5.6 'Analysis of ambient conditions during 2006' (I/RA/11291/06.091/MSA) in the framework of the study 'Extension of the study about density currents in the Beneden Zeeschelde'

APPENDIX B.

LONG-TERM MEASUREMENTS AT BUOY 84 AND BUOY 97

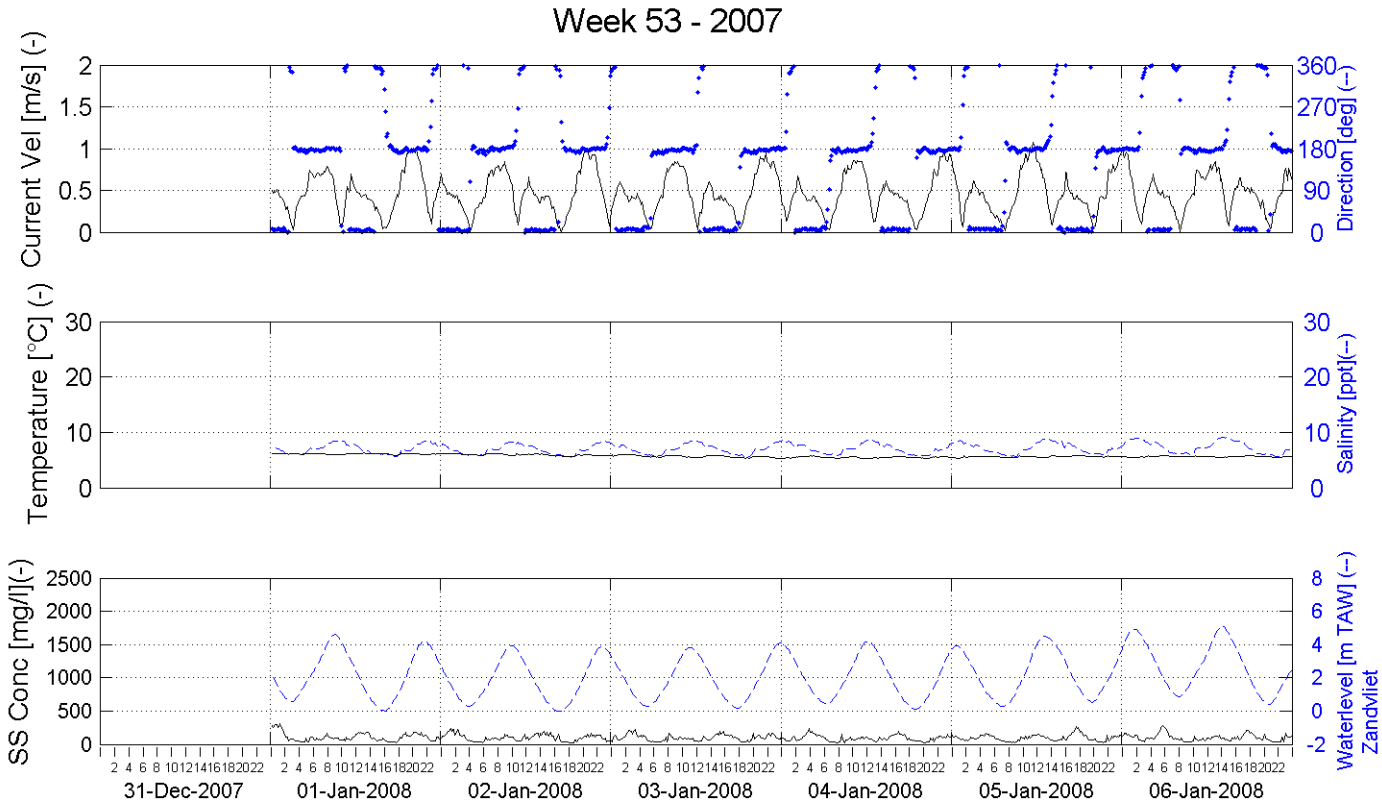
B.1 Datasheets weekseries

Datasheet order

Nr	*Location*	*Depth of Instrument*		*Sensor*	*Period*
		[m] above bottom	*[m TAW]*		
1	Buoy 84	3.3	-6.0	Aanderaa 0579	01/01/2008 – 31/03/2008
2	Buoy 84	0.8	-8.0	Aanderaa 1153	01/01/2008 – 30/01/2008
				Aanderaa 0248	25/02/2008 – 31/03/2008
3	Buoy 97	3.3	-4.8	Aanderaa 1220	01/01/2008 – 30/01/2008
				Aanderaa 1166	30/01/2008 – 27/02/2008
				Aanderaa 1220	27/02/2008 – 31/03/2008
4	Buoy 97	0.8	-7.2	Aanderaa 1229	01/01/2008 – 30/01/2008
				Aanderaa 1169	30/01/2008 – 27/02/2008
				Aanderaa 1229	27/02/2008 – 31/03/2008

B.1.1. Buoy 84 top

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Buoy 84 top - 3.3m above bottom (-6m TAW)

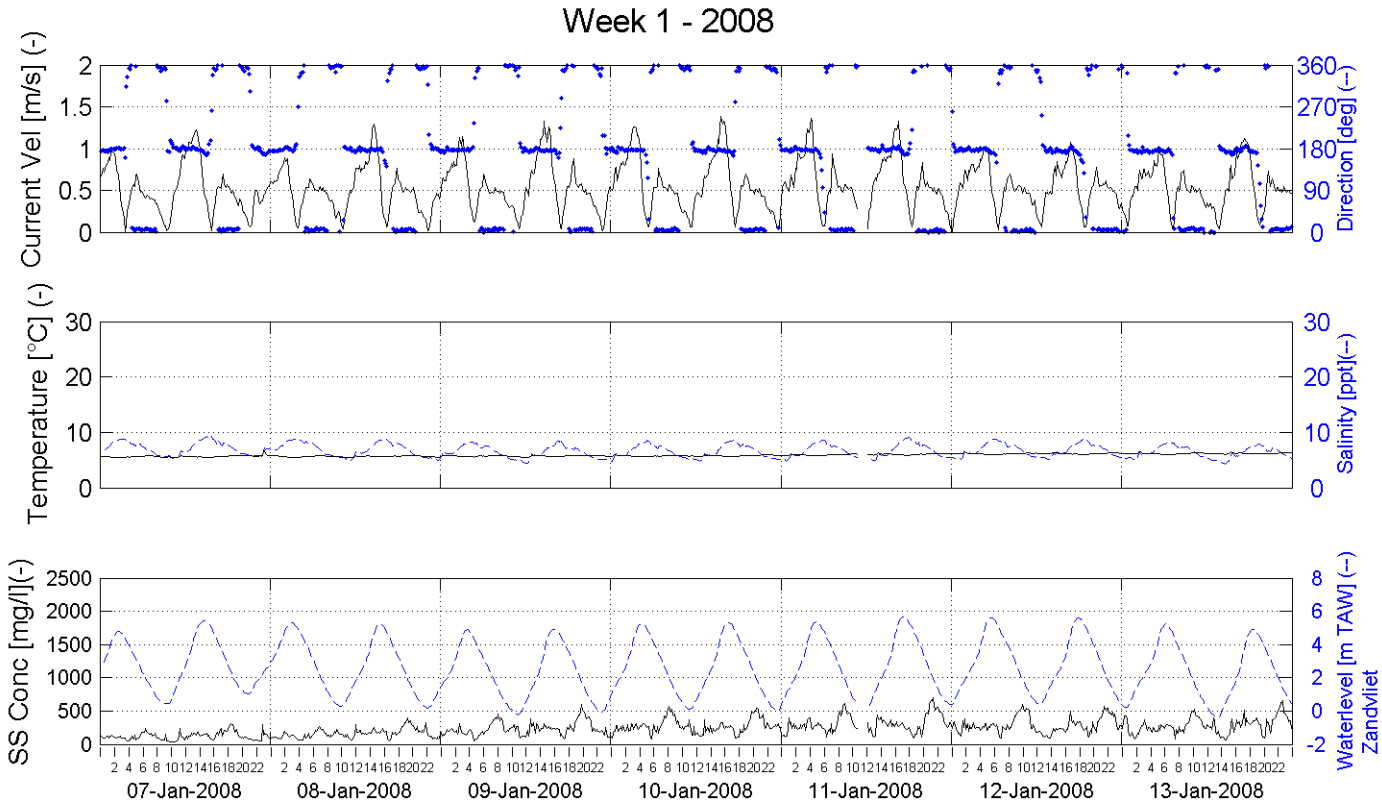
Processed by:

IMDC

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Buoy 84 top - 3.3m above bottom (-6m TAW)

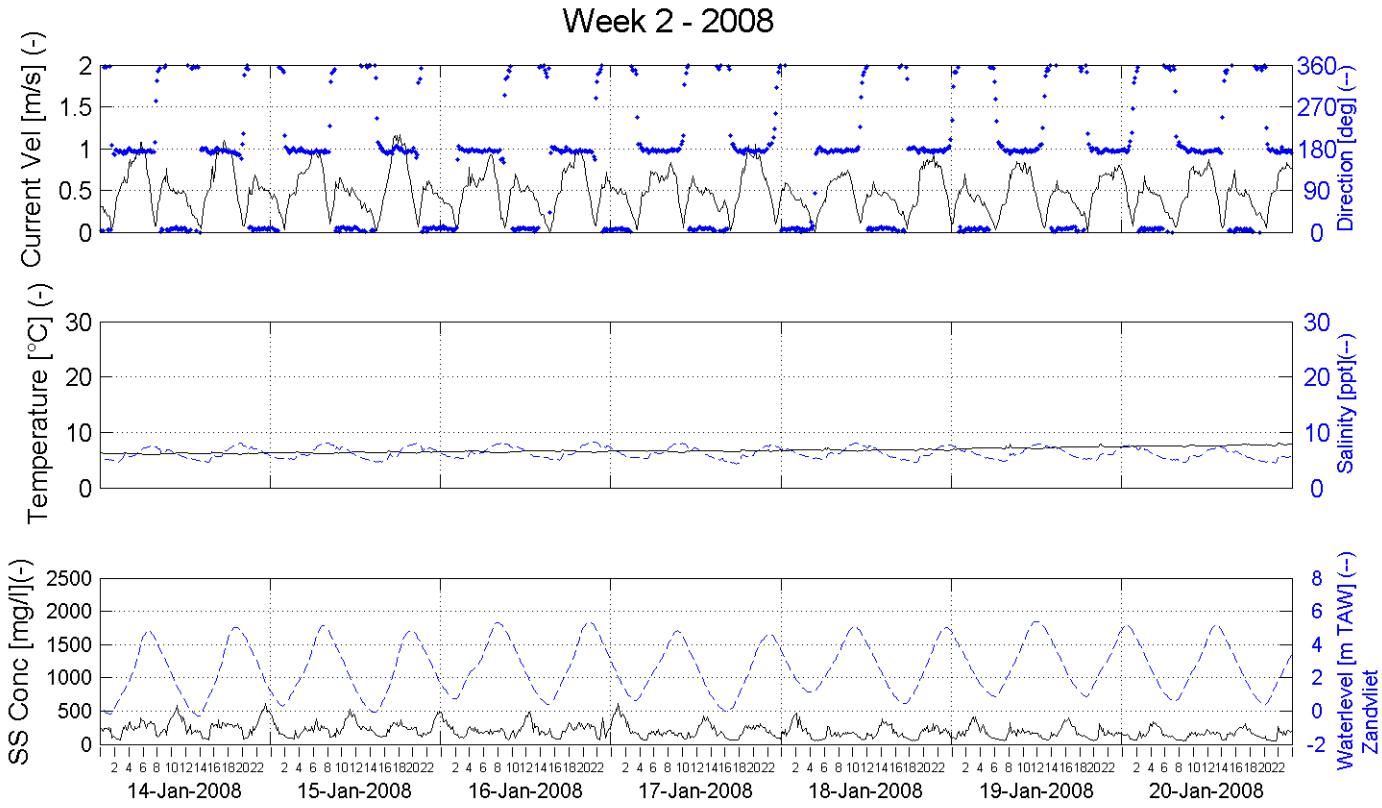
Processed by:

IMDC

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

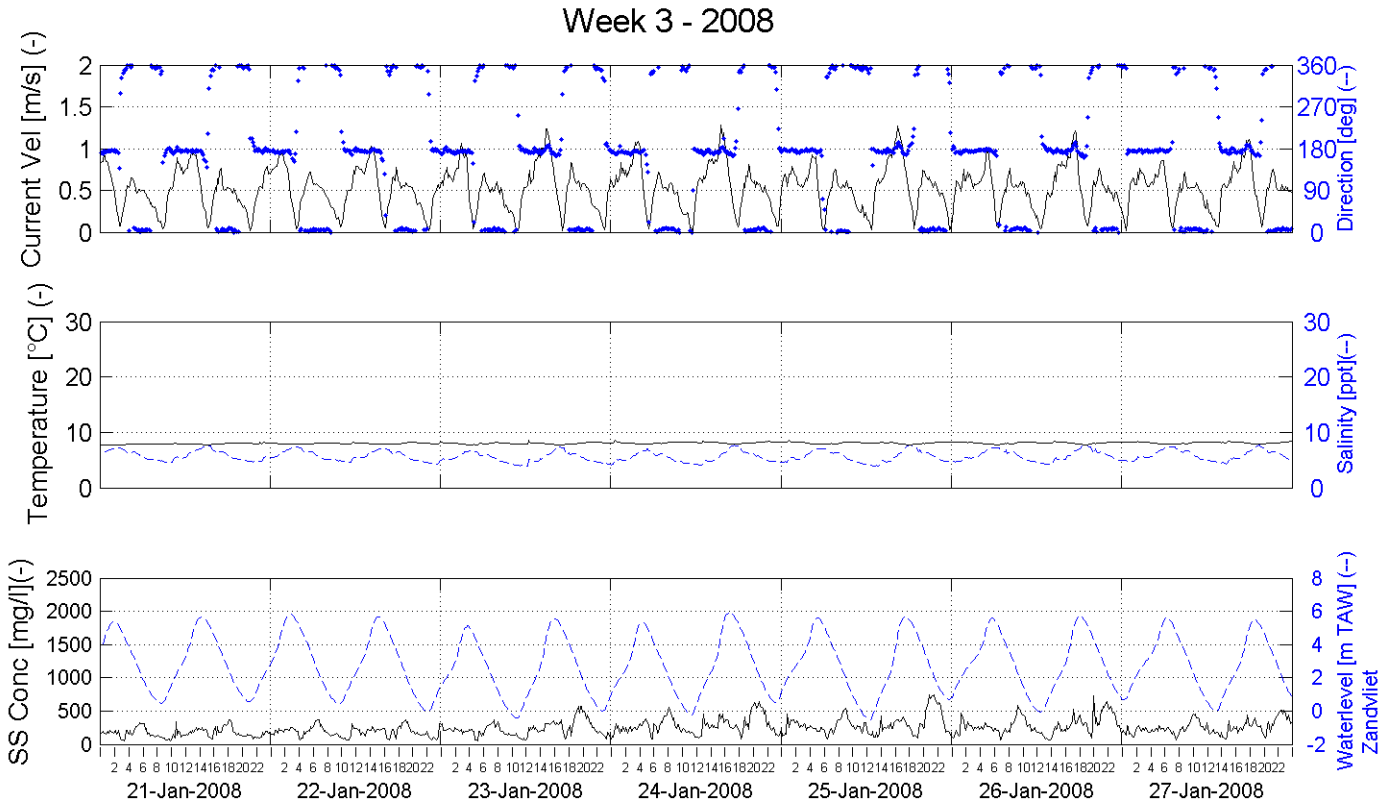
Buoy 84 top - 3.3m above bottom (-6m TAW)

Processed by:

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Buoy 84 top - 3.3m above bottom (-6m TAW)

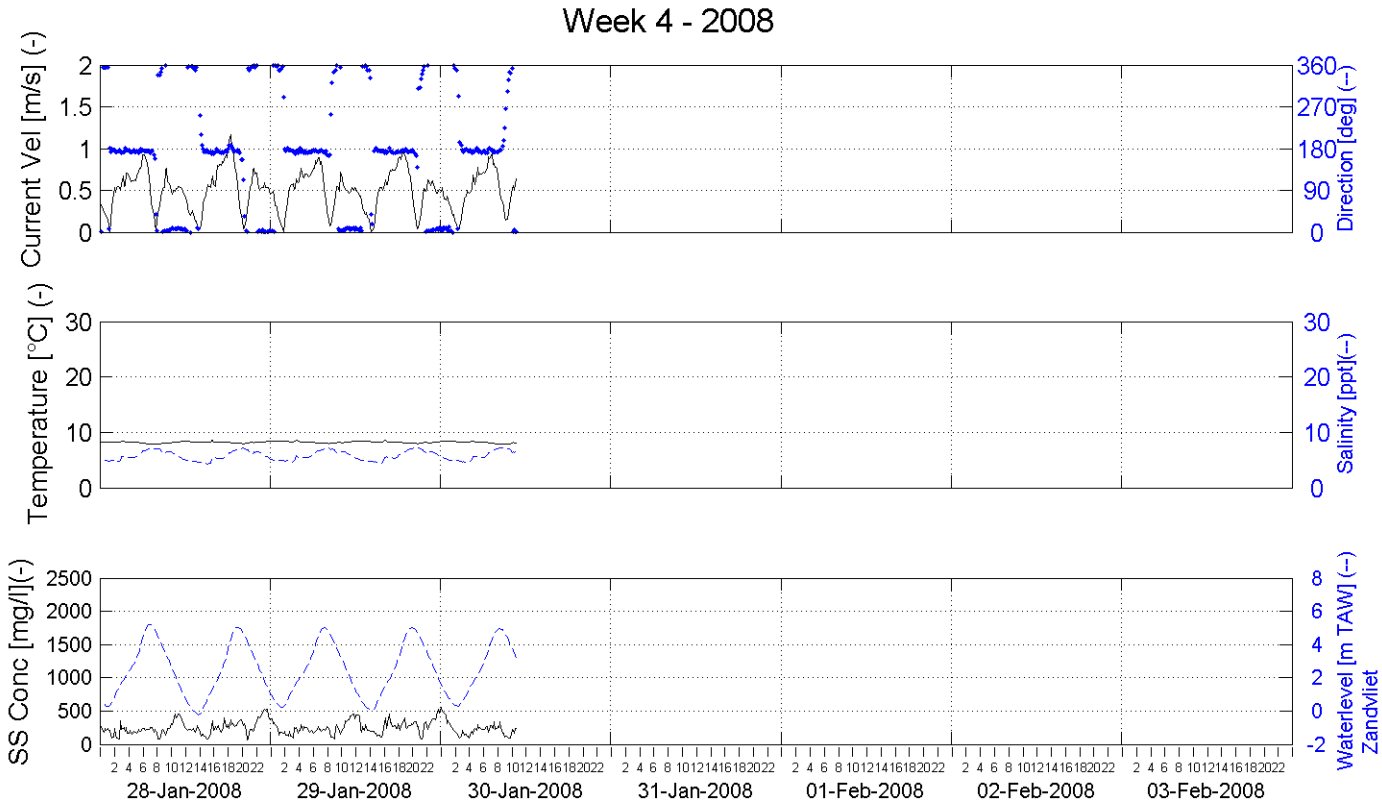
Processed by:

IMDC

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

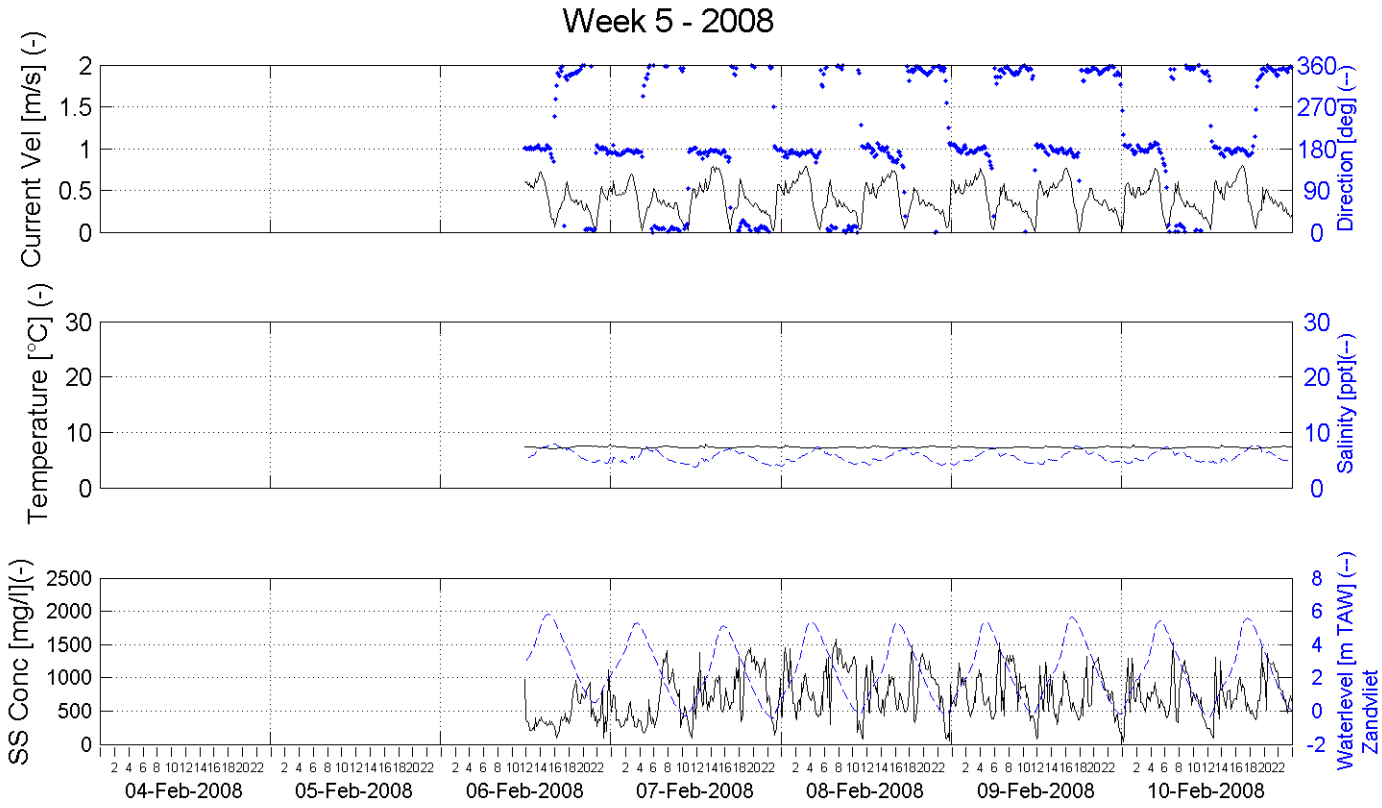
Buoy 84 top - 3.3m above bottom (-6m TAW)

Processed by:

In Association with:

I/RA/11283/07.100/MSA

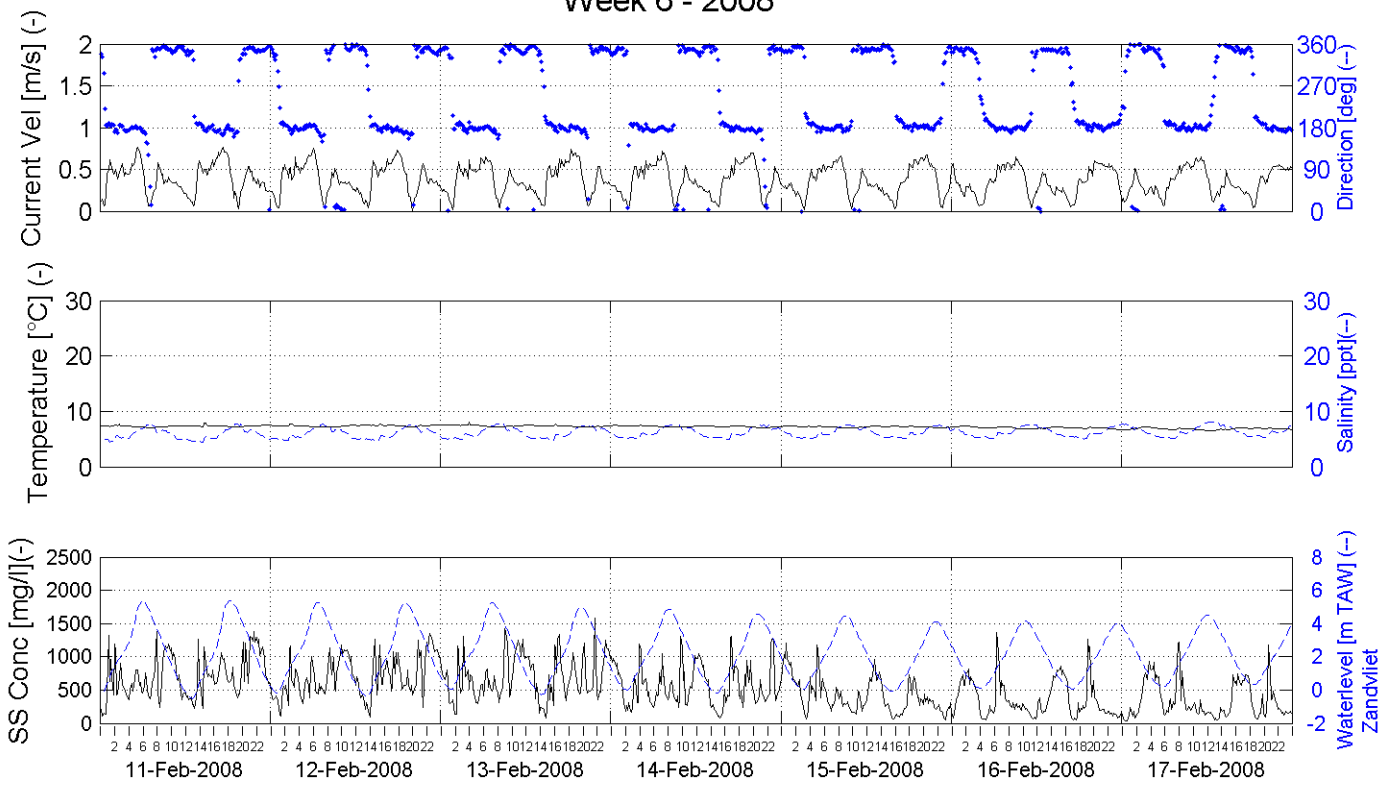
Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide	Processed by: IMDC
Location: Buoy 84 top - 3.3m above bottom (-6m TAW)	In Association with: I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008

Week 6 - 2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Buoy 84 top - 3.3m above bottom (-6m TAW)

Processed by:

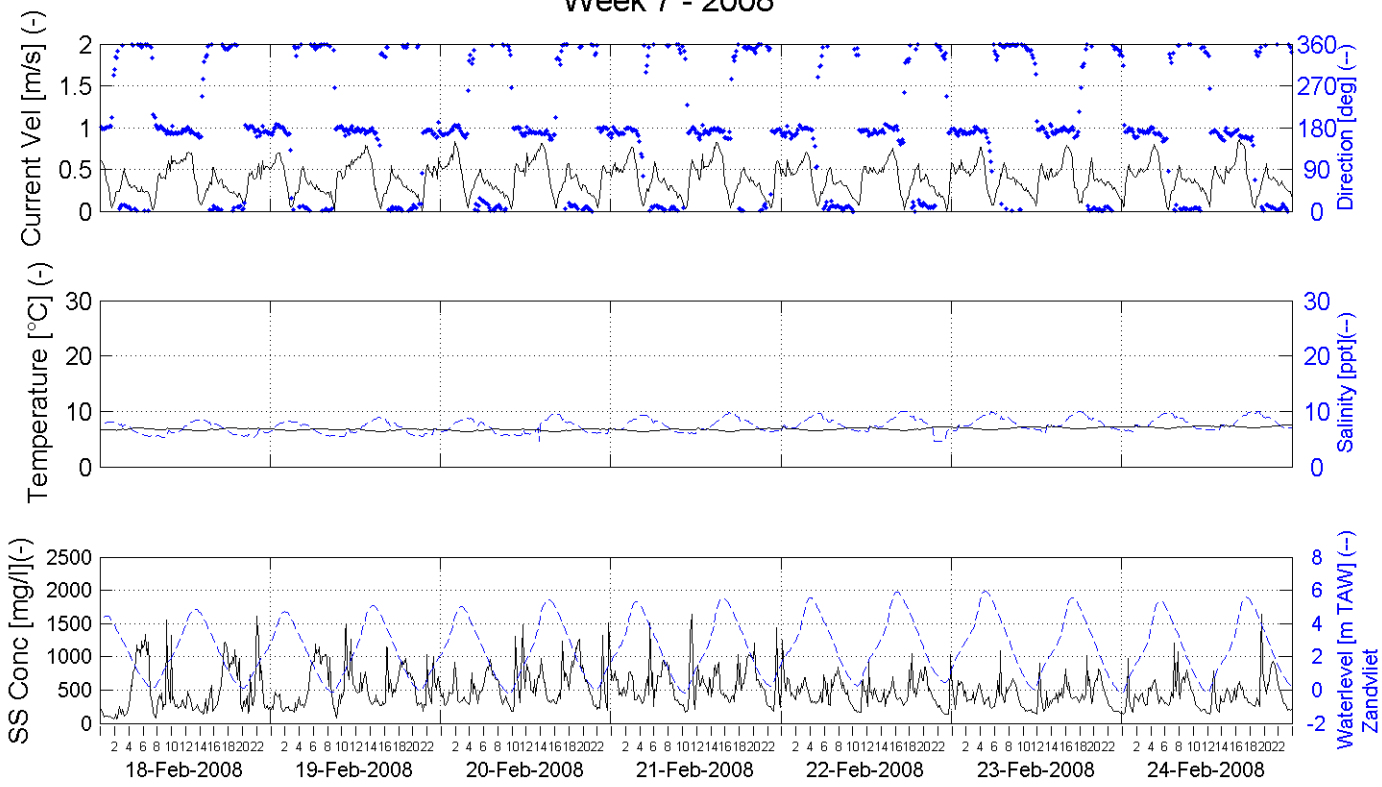
IMDC

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008

Week 7 - 2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Buoy 84 top - 3.3m above bottom (-6m TAW)

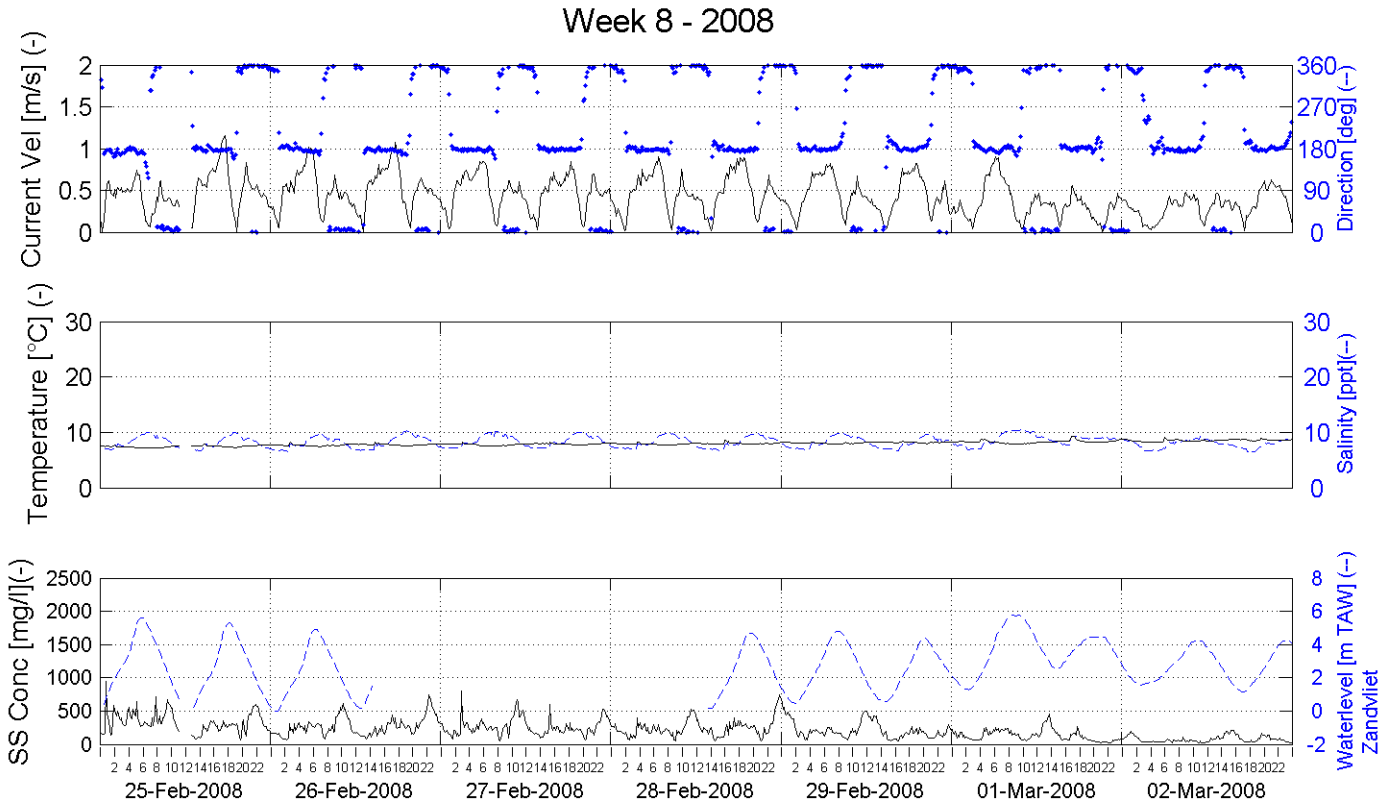
Processed by:

IMDC

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Buoy 84 top - 3.3m above bottom (-6m TAW)

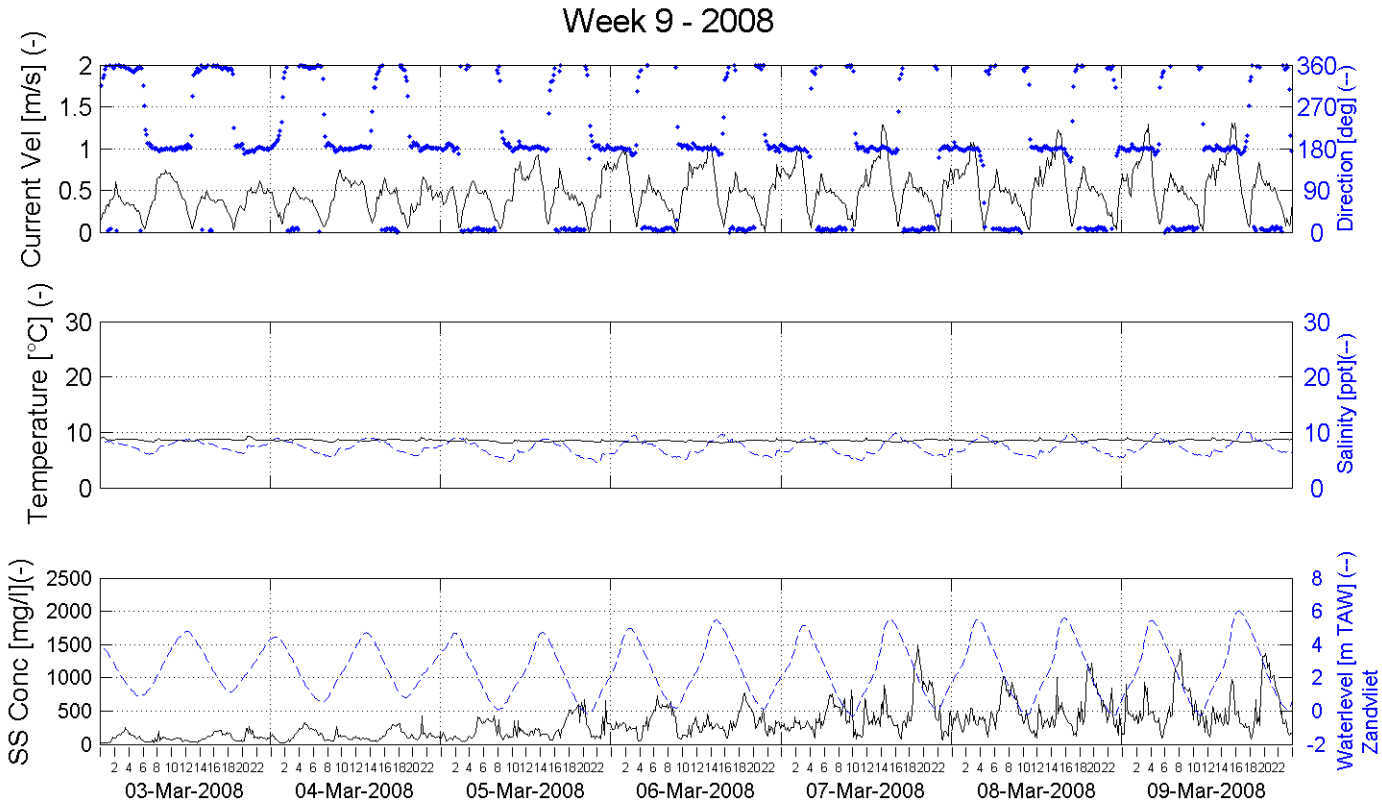
Processed by:

IMDC

In Association with:

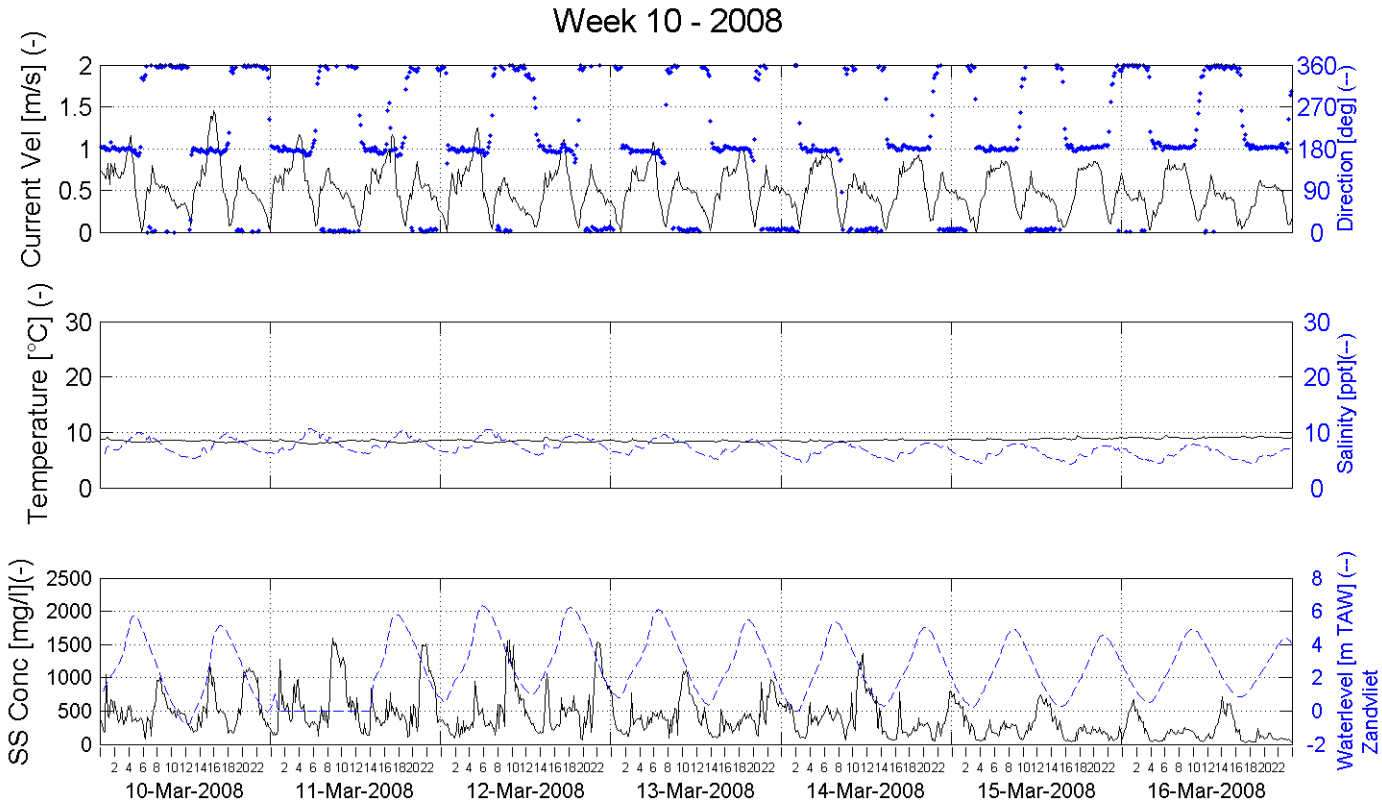
I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide	Processed by: IMDC, WL | delft hydraulics, GEMS International
Location: Buoy 84 top - 3.3m above bottom (-6m TAW)	In Association with: I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Buoy 84 top - 3.3m above bottom (-6m TAW)

Processed by:

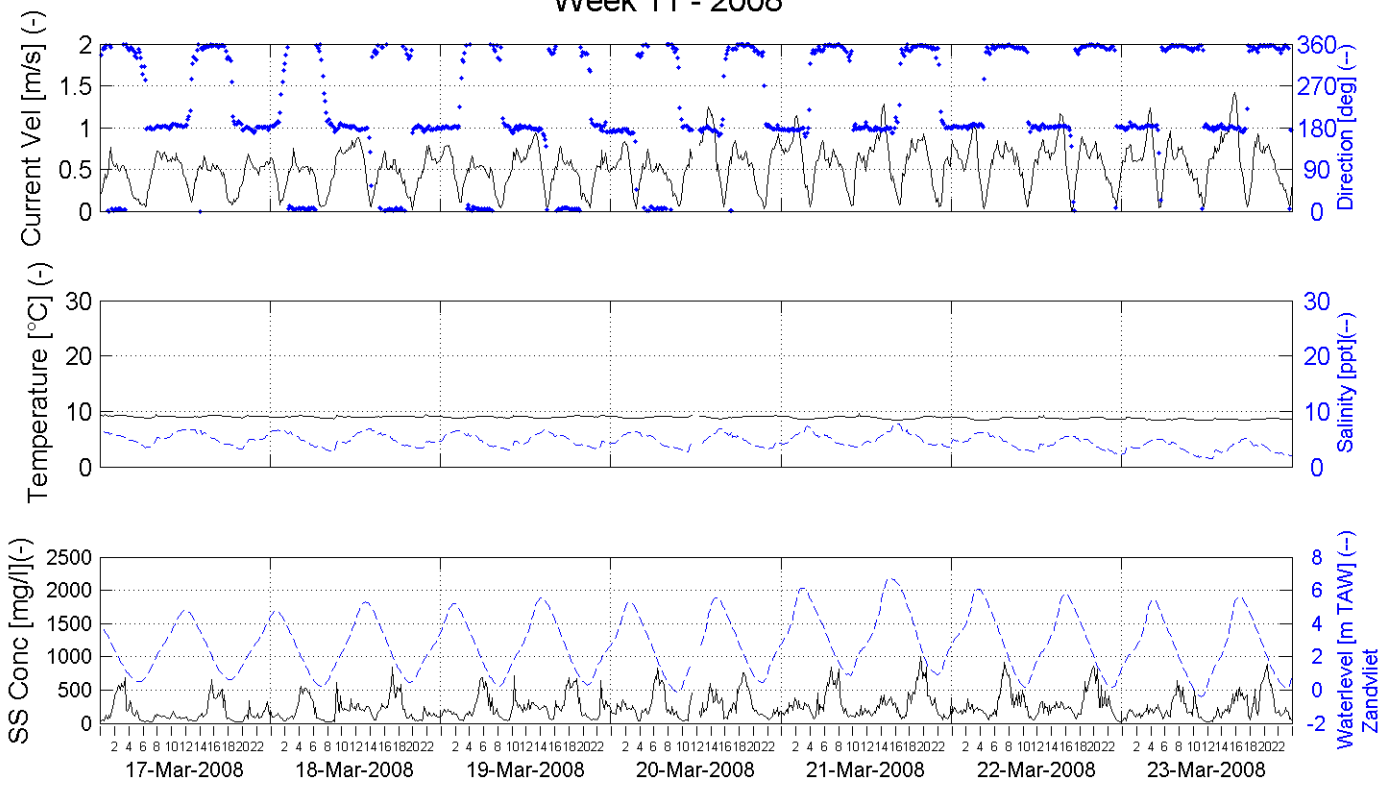
IMDC

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008

Week 11 - 2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Buoy 84 top - 3.3m above bottom (-6m TAW)

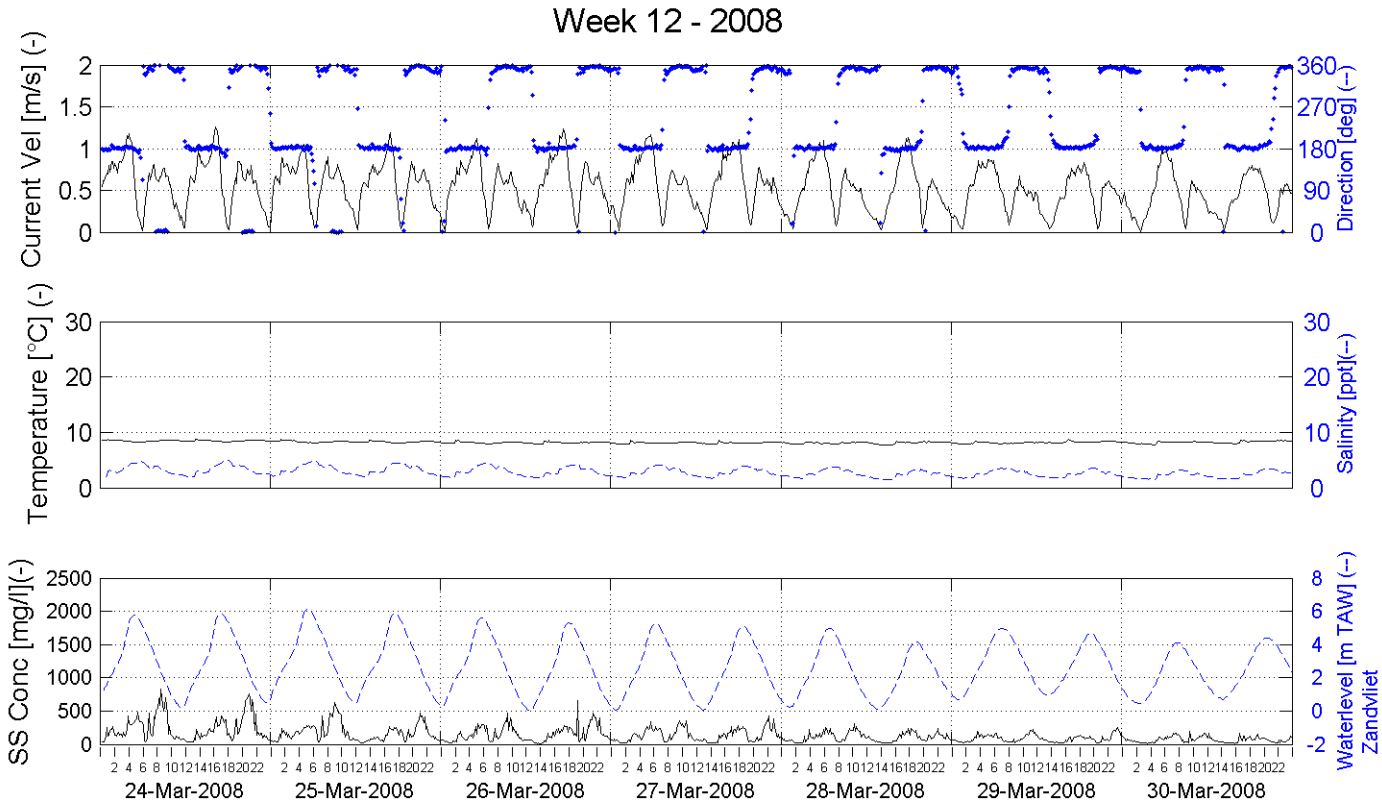
Processed by:

IMDC

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Buoy 84 top - 3.3m above bottom (-6m TAW)

Processed by:

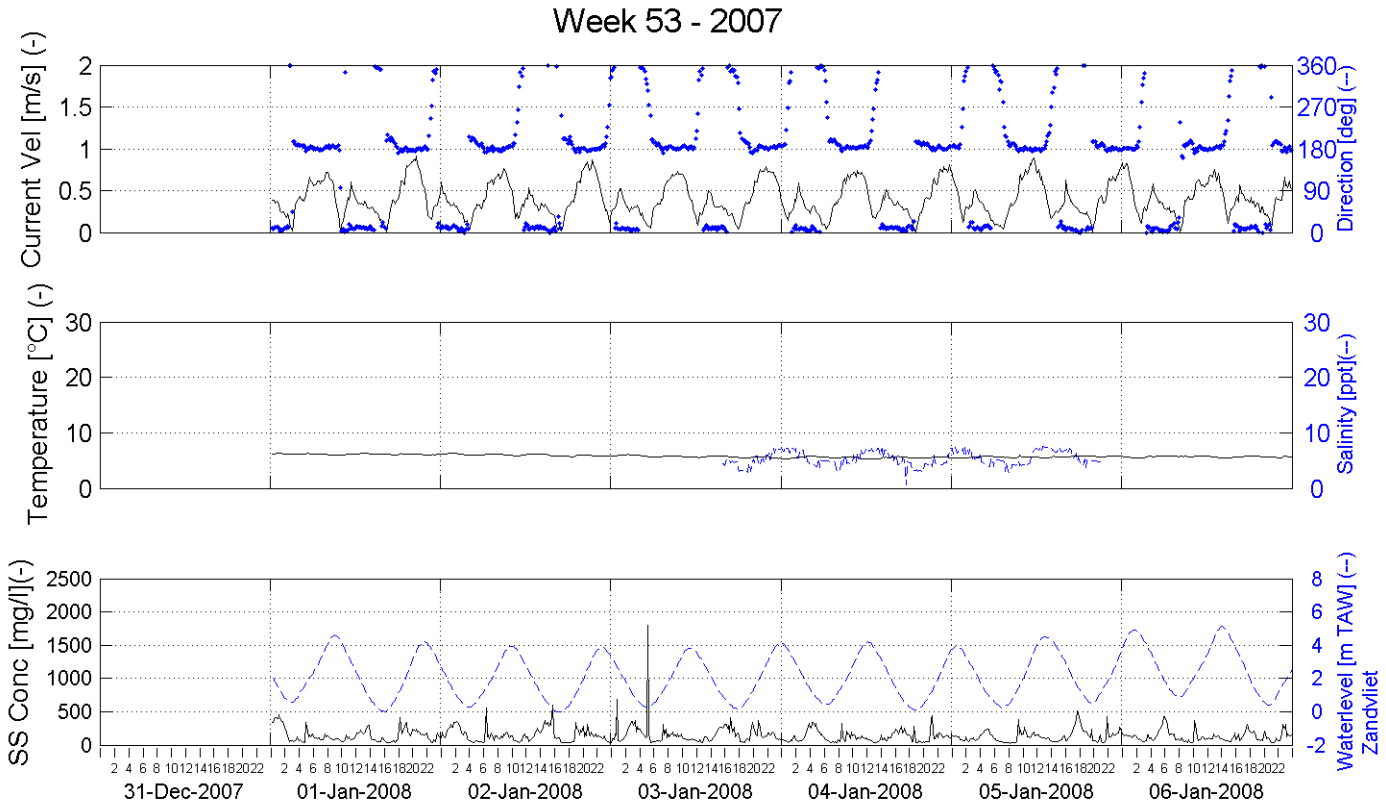
IMDC

In Association with:

I/RA/11283/07.100/MSA

B.1.2. Buoy 84 bottom

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Buoy 84 bottom - 0.8m above bottom (-8m TAW)

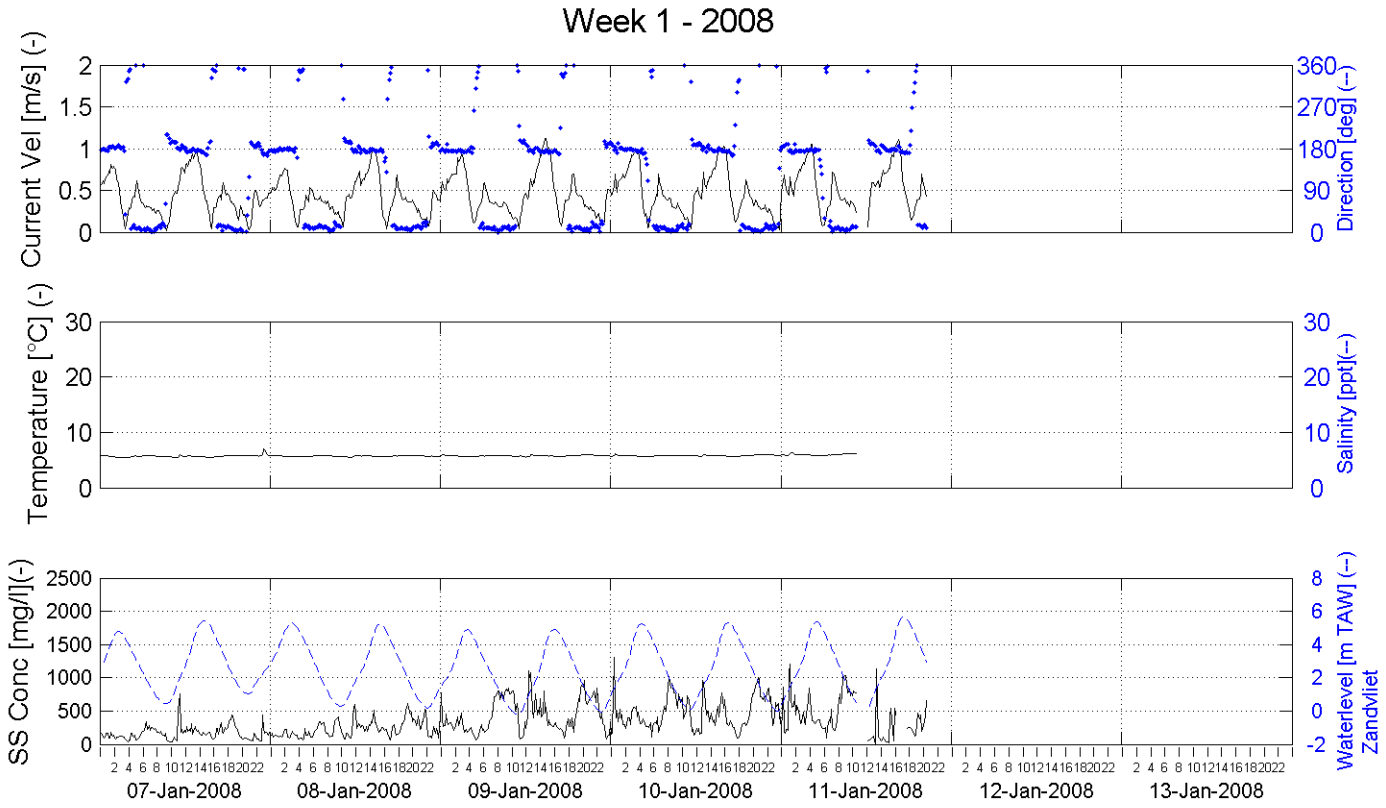
Processed by:

IMDC

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

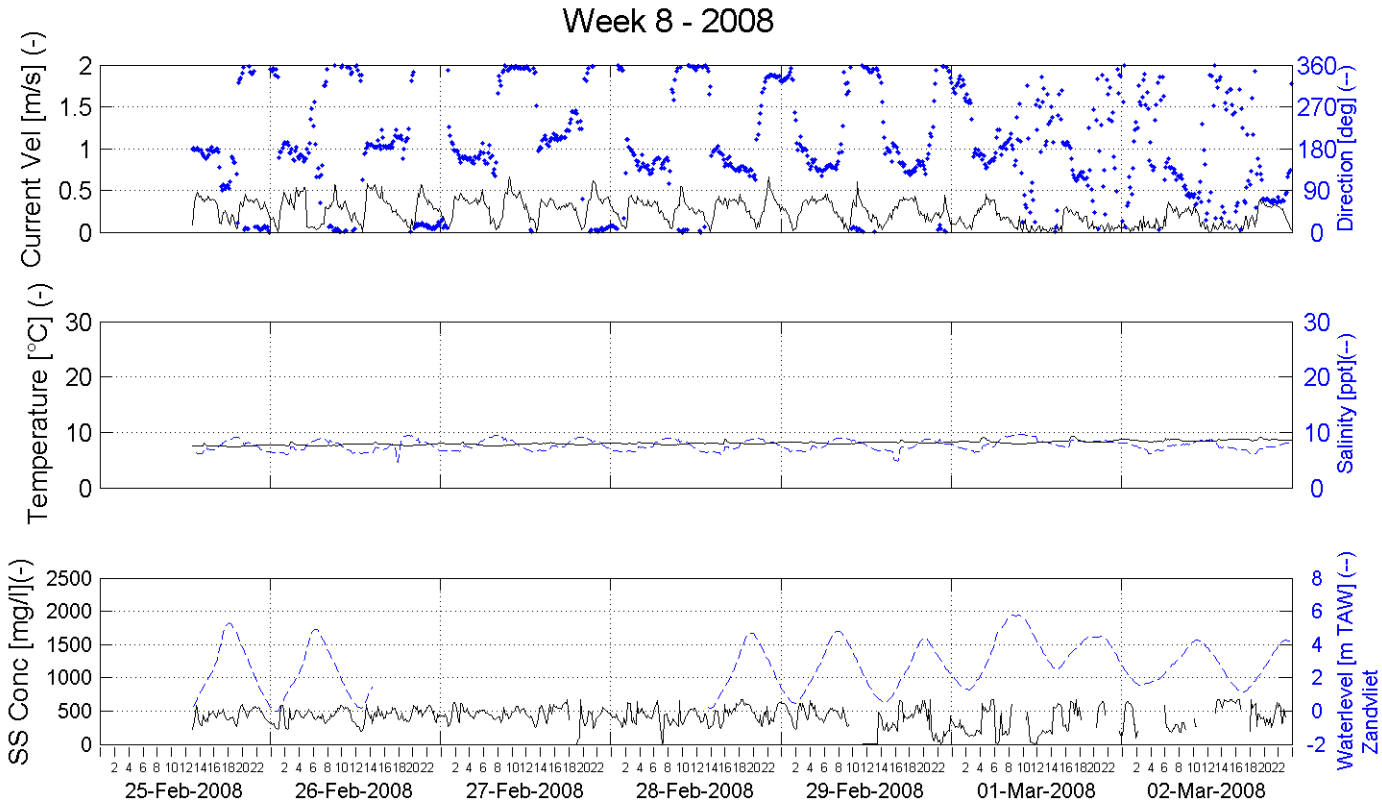
Buoy 84 bottom - 0.8m above bottom (-8m TAW)

Processed by:

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Buoy 84 bottom - 0.8m above bottom (-8m TAW)

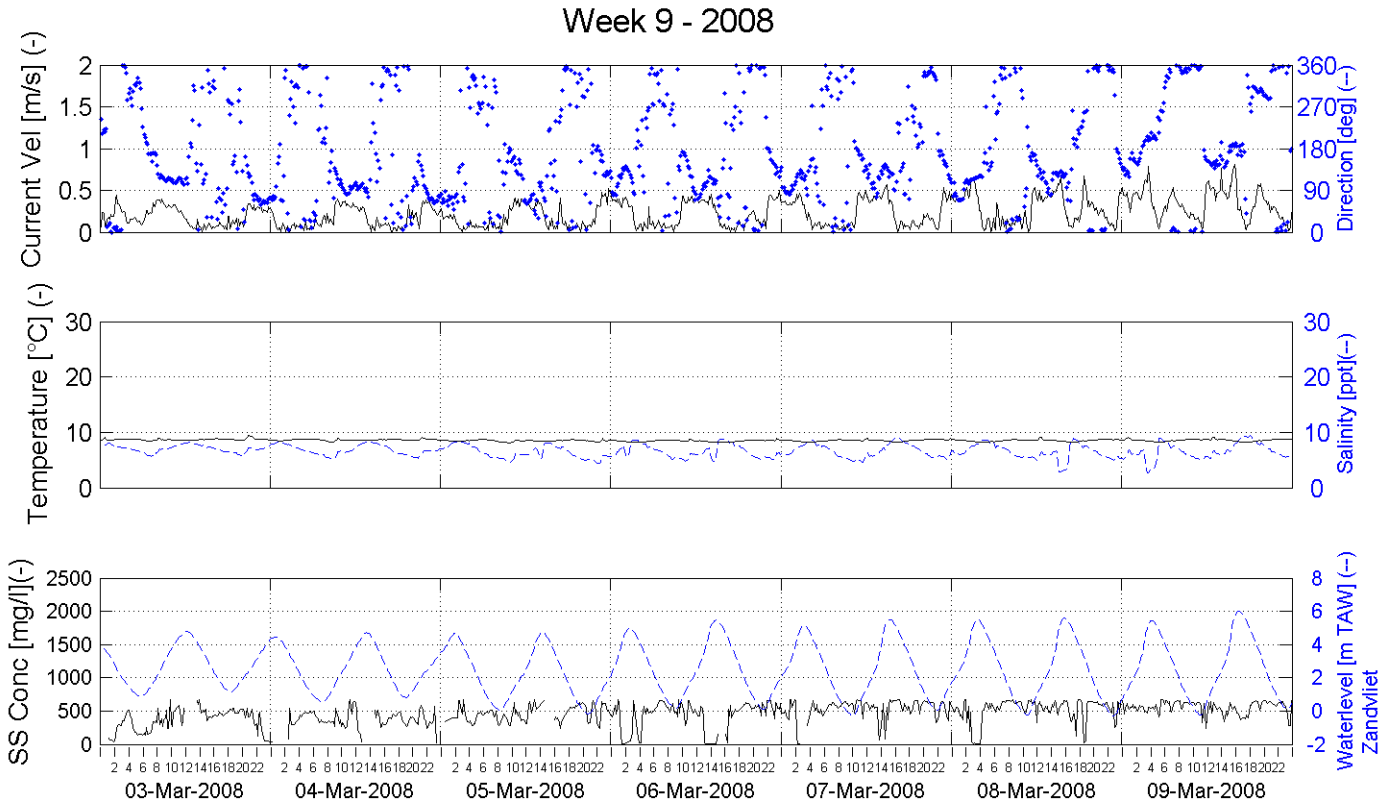
Processed by:

IMDC

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Buoy 84 bottom - 0.8m above bottom (-8m TAW)

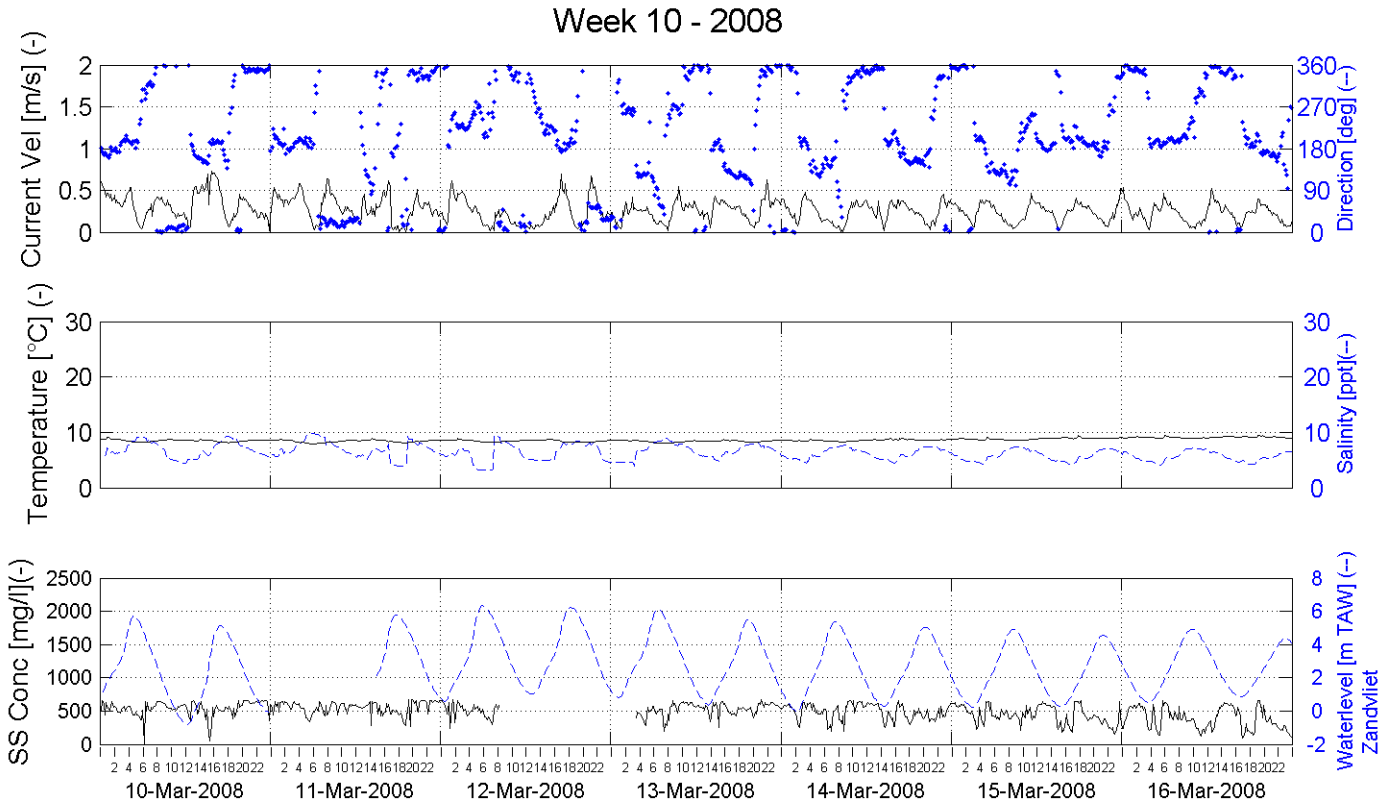
Processed by:

IMDC

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Buoy 84 bottom - 0.8m above bottom (-8m TAW)

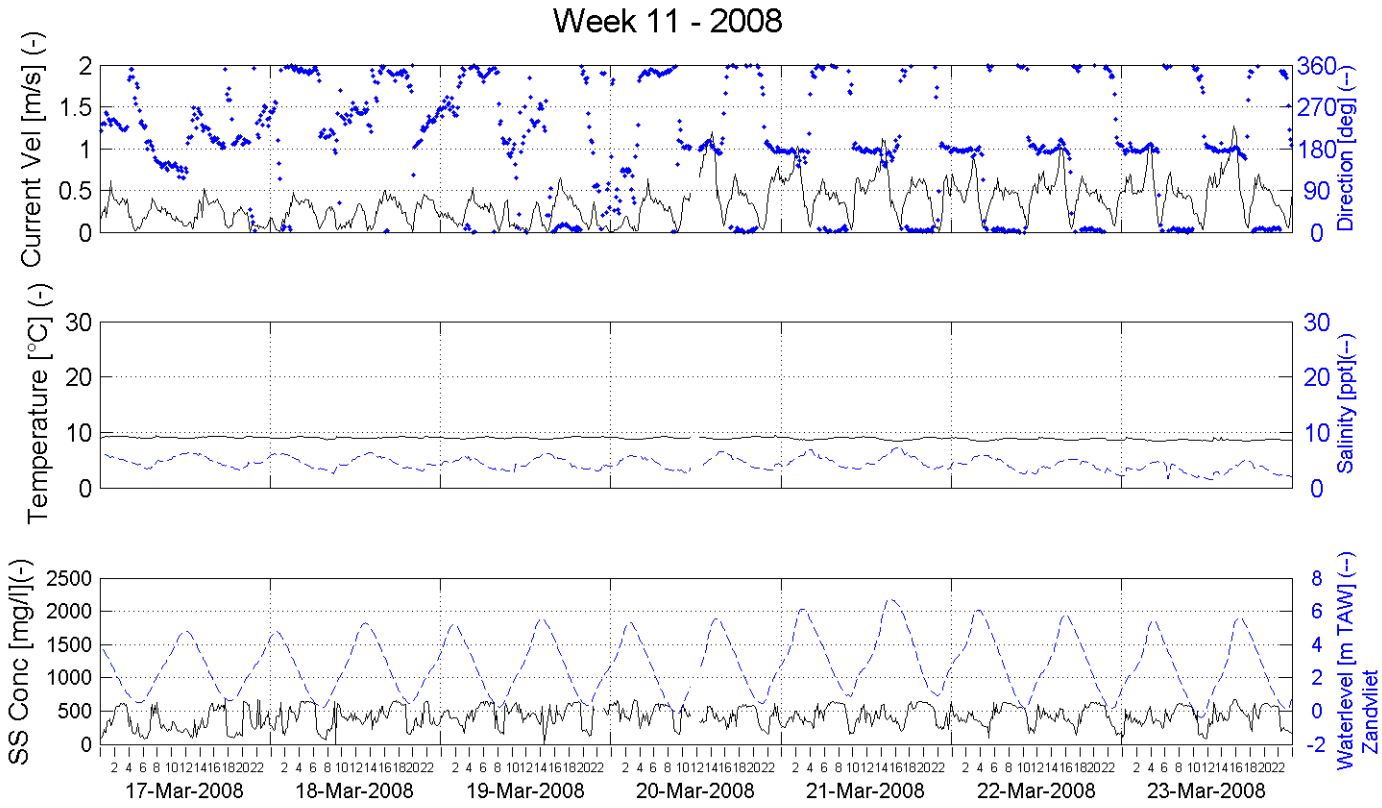
Processed by:

IMDC

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Buoy 84 bottom - 0.8m above bottom (-8m TAW)

Processed by:

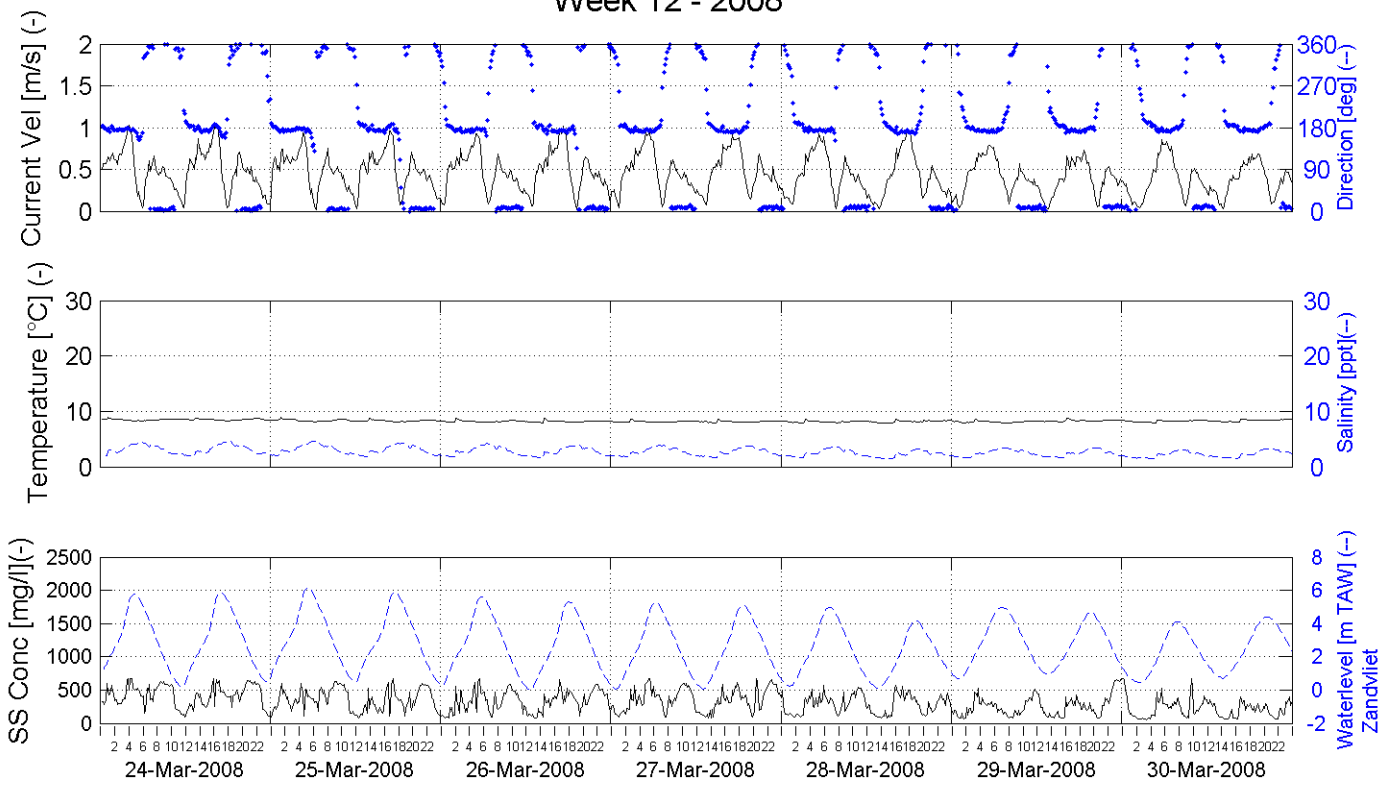
IMDC

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008

Week 12 - 2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Buoy 84 bottom - 0.8m above bottom (-8m TAW)

Processed by:

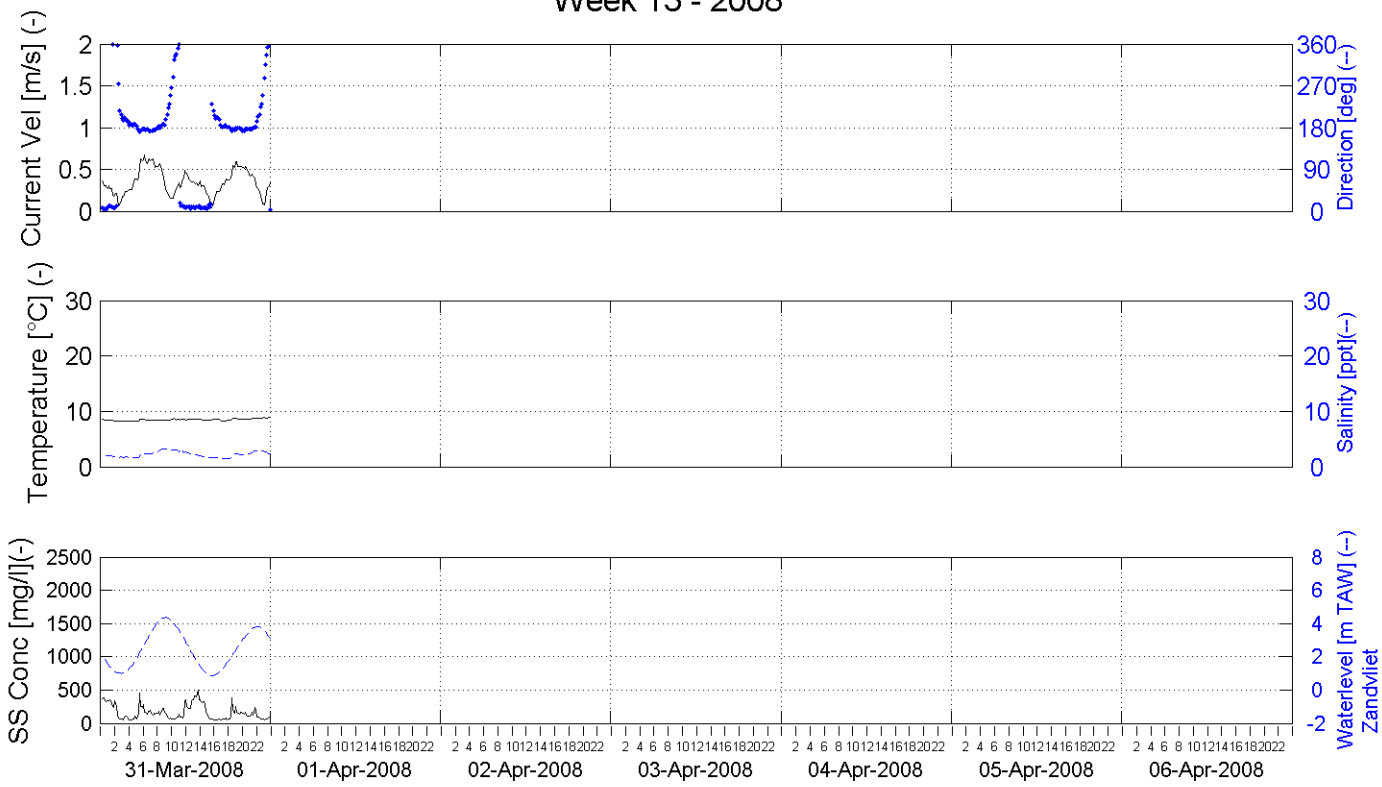
IMDC

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008

Week 13 - 2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Buoy 84 bottom - 0.8m above bottom (-8m TAW)

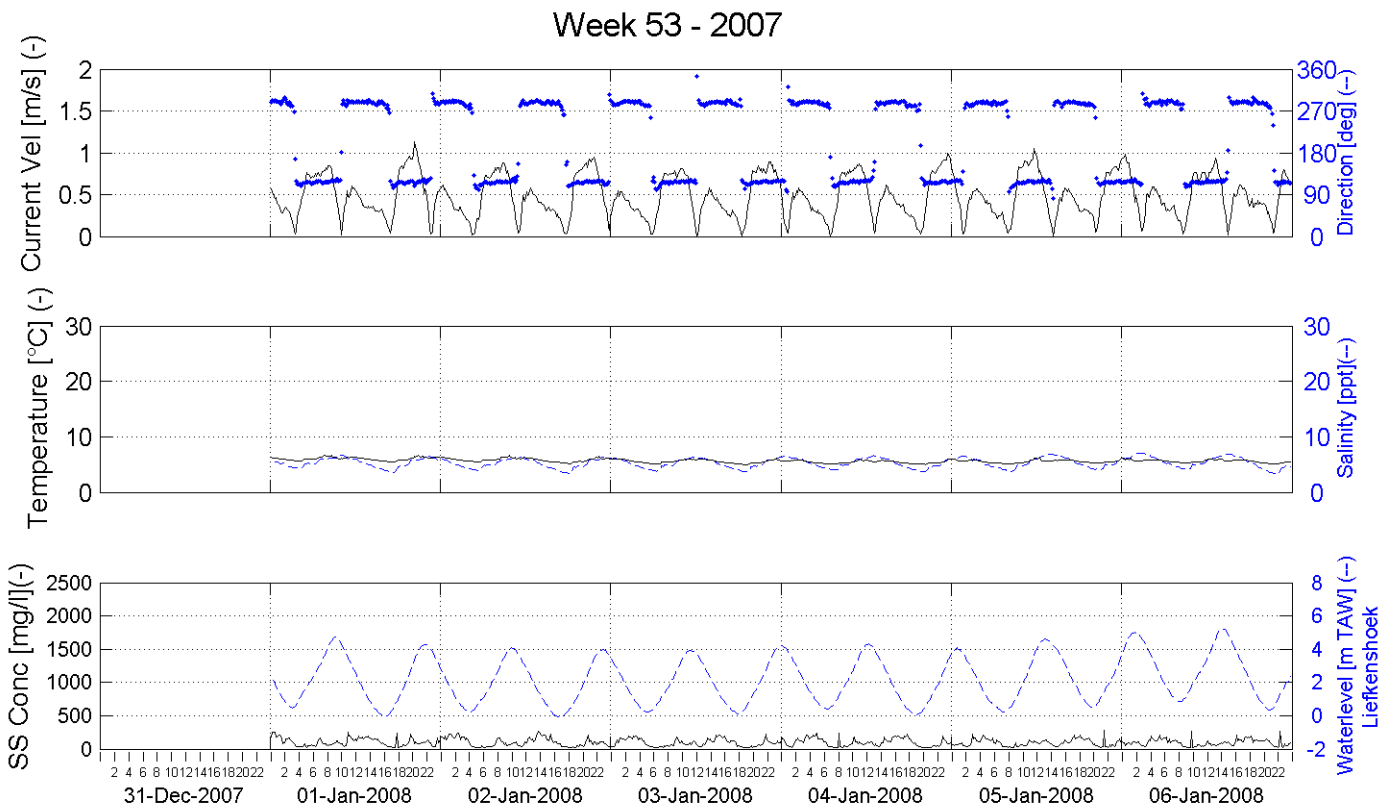
Processed by:

In Association with:

I/RA/11283/07.100/MSA

B.1.3. Buoy 97 top

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Buoy 97 top - 3.3m above bottom (-4.8m TAW)

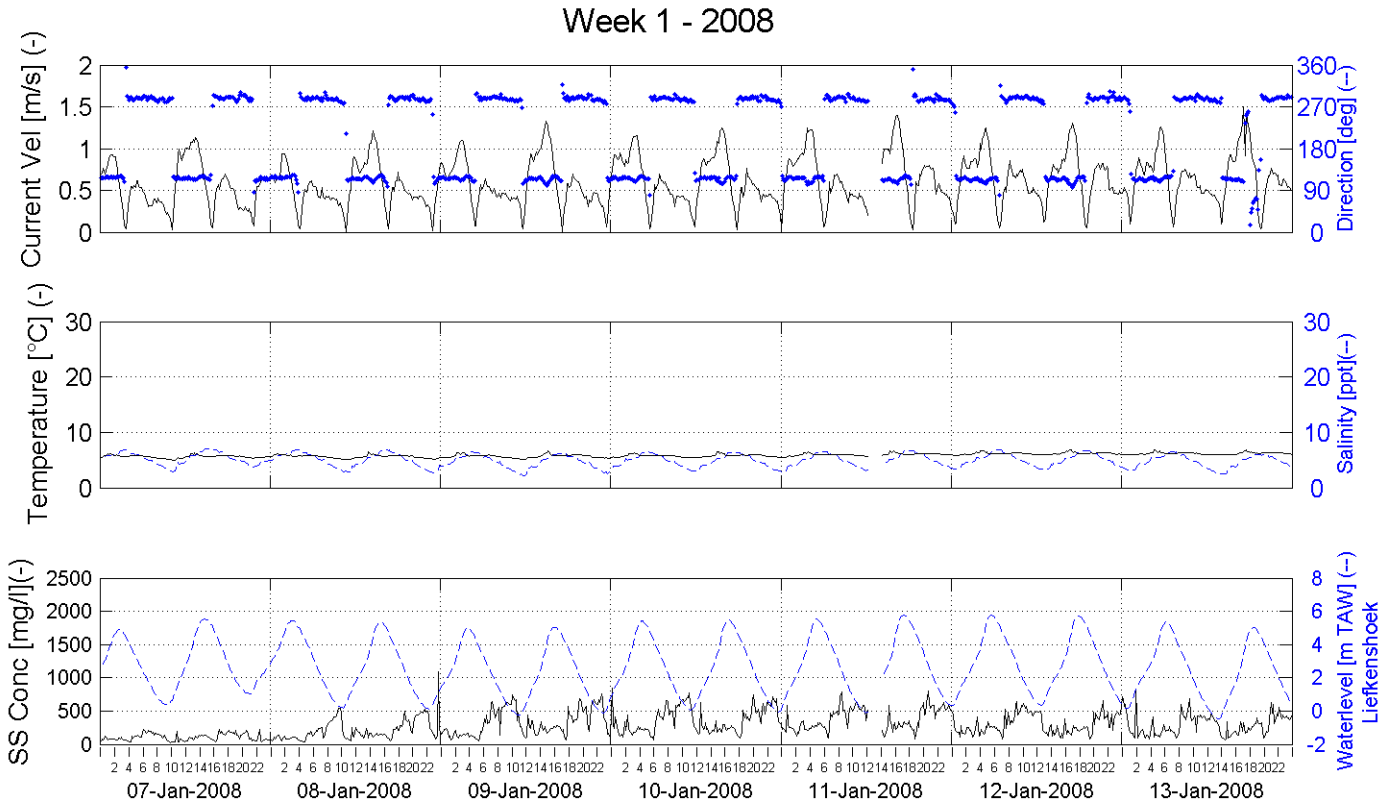
Processed by:

IMDC

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Buoy 97 top - 3.3m above bottom (-4.8m TAW)

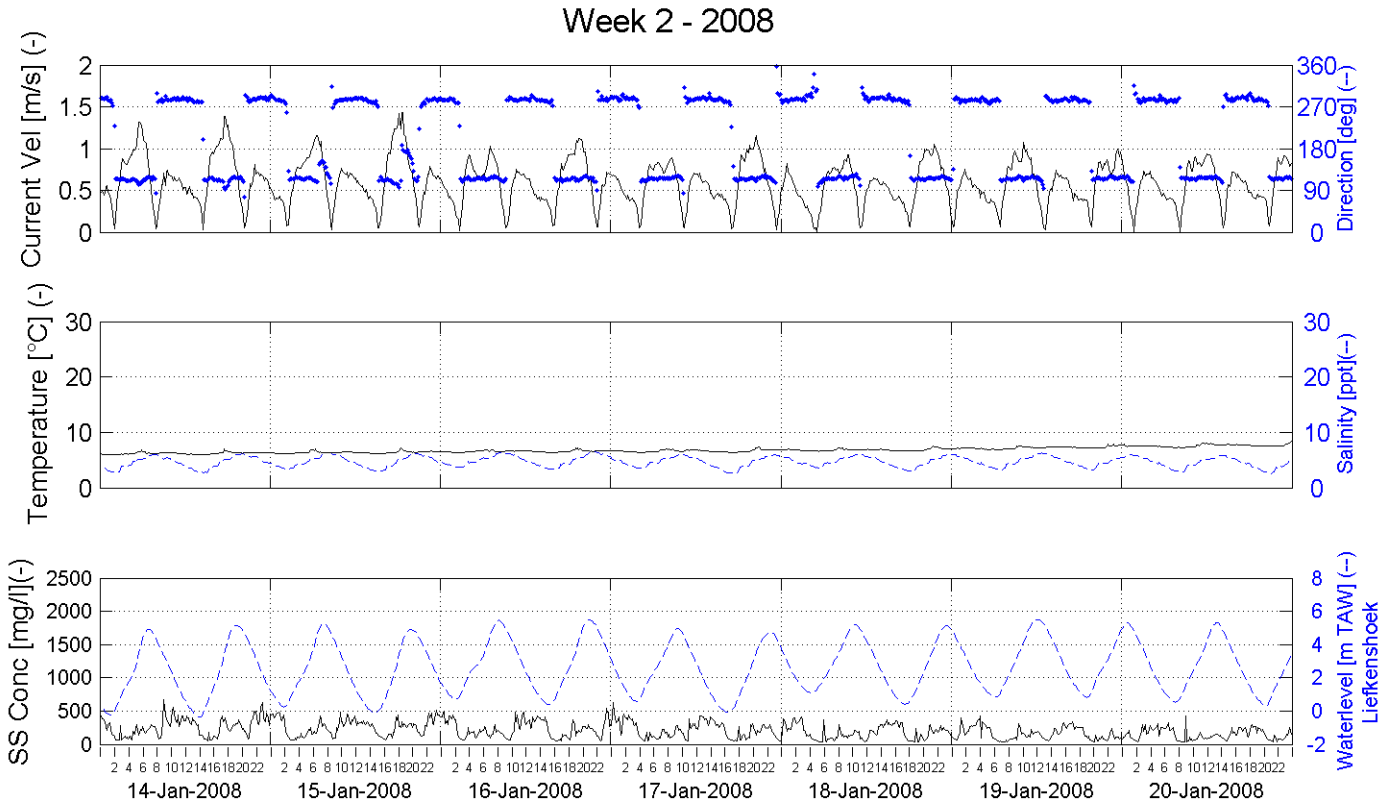
Processed by:

IMDC

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Buoy 97 top - 3.3m above bottom (-4.8m TAW)

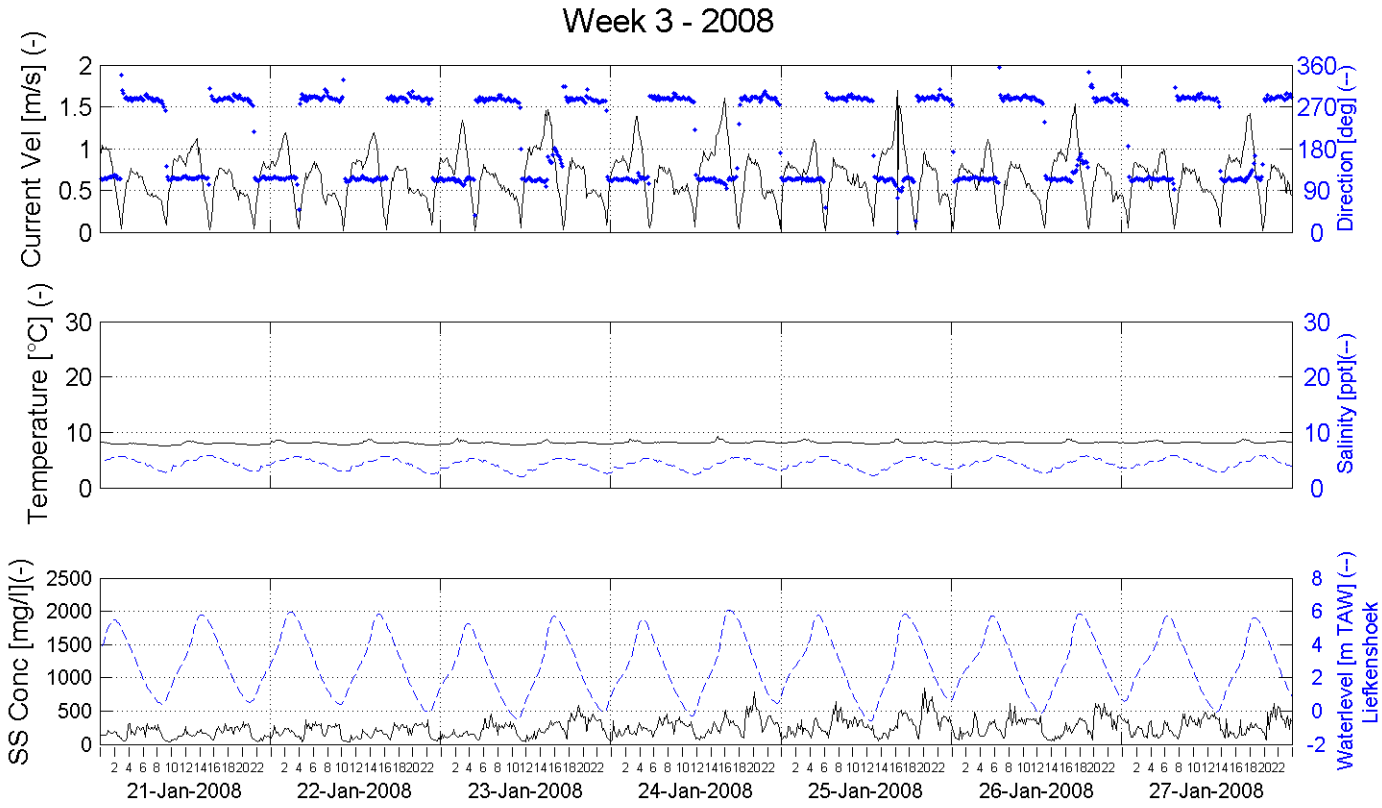
Processed by:

IMDC

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Buoy 97 top - 3.3m above bottom (-4.8m TAW)

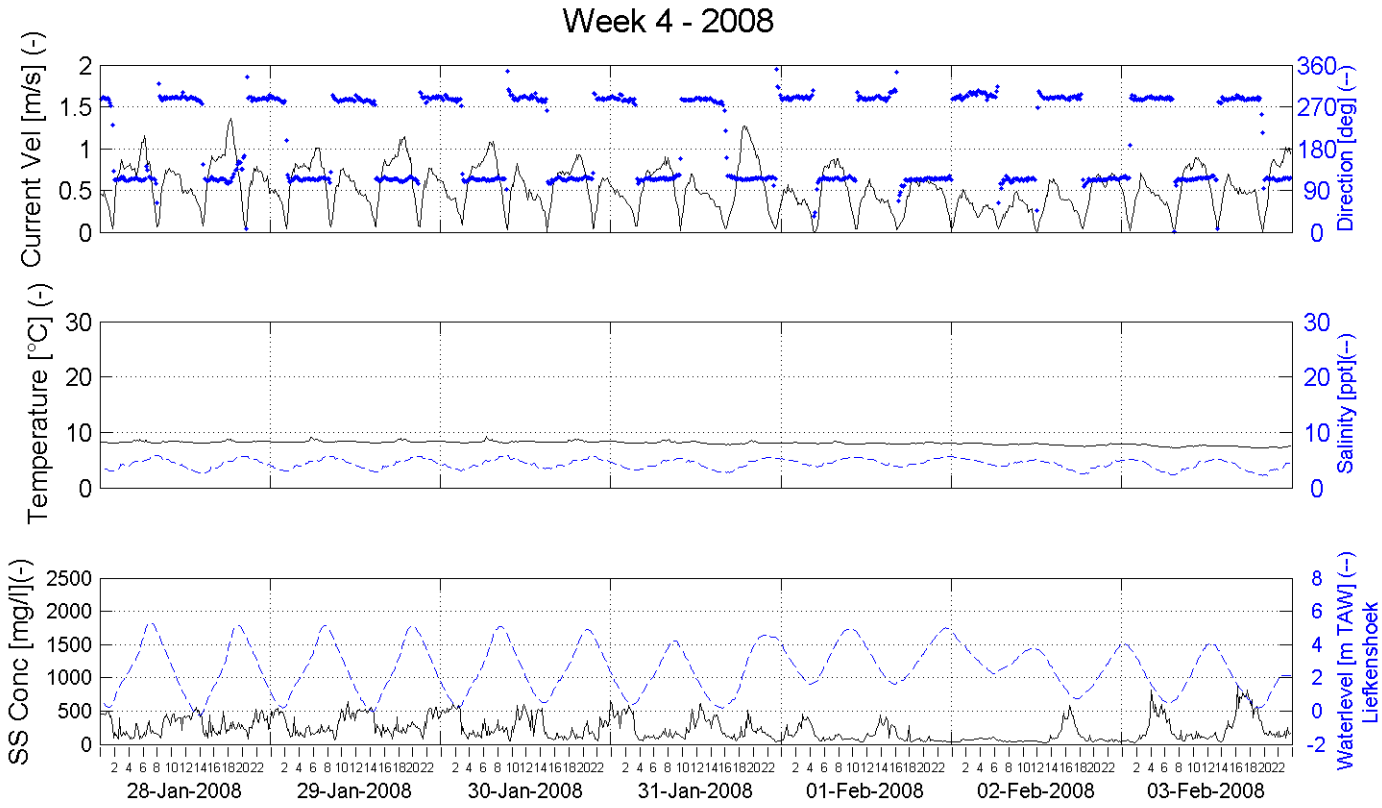
Processed by:

IMDC

In Association with:

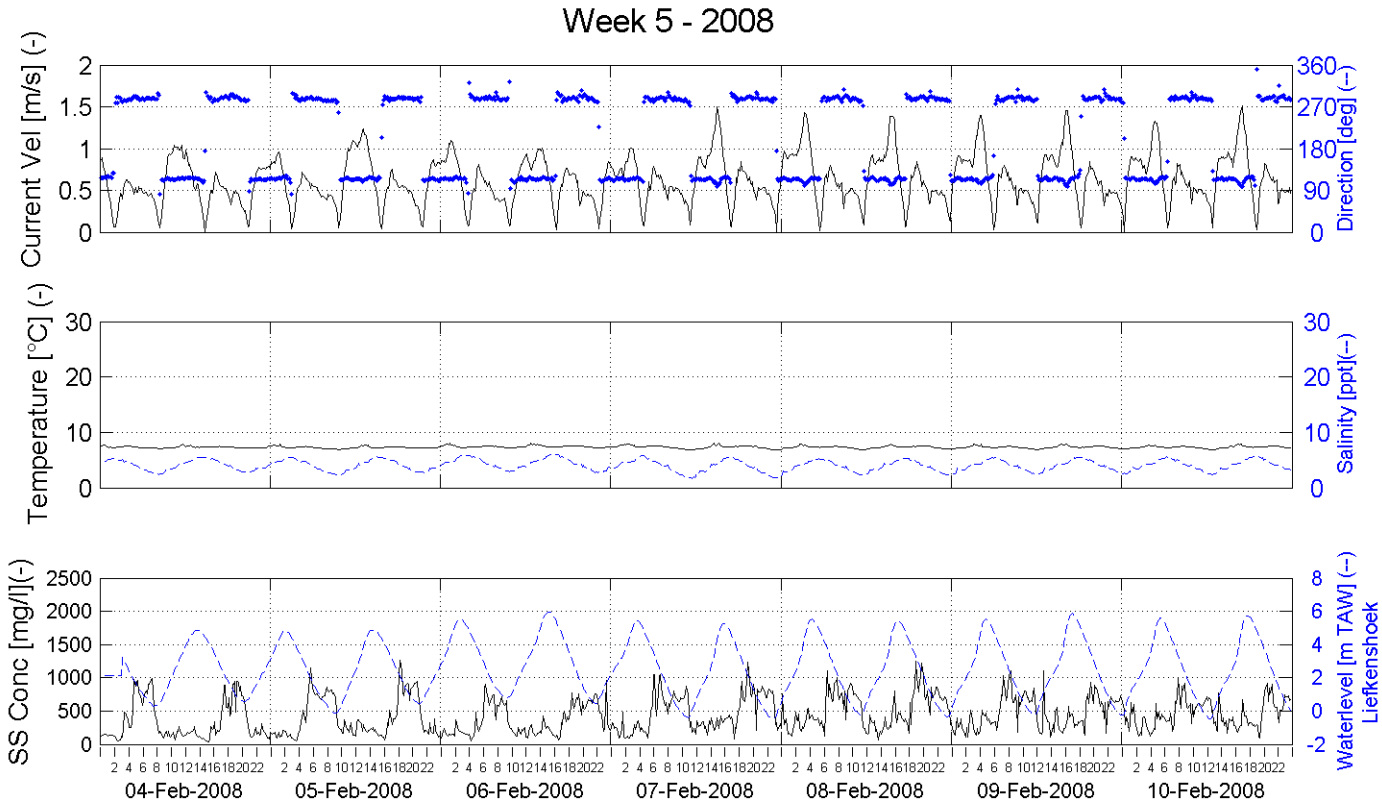
I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide	Processed by: IMDC
Location: Buoy 97 top - 3.3m above bottom (-4.8m TAW)	In Association with: I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Buoy 97 top - 3.3m above bottom (-4.8m TAW)

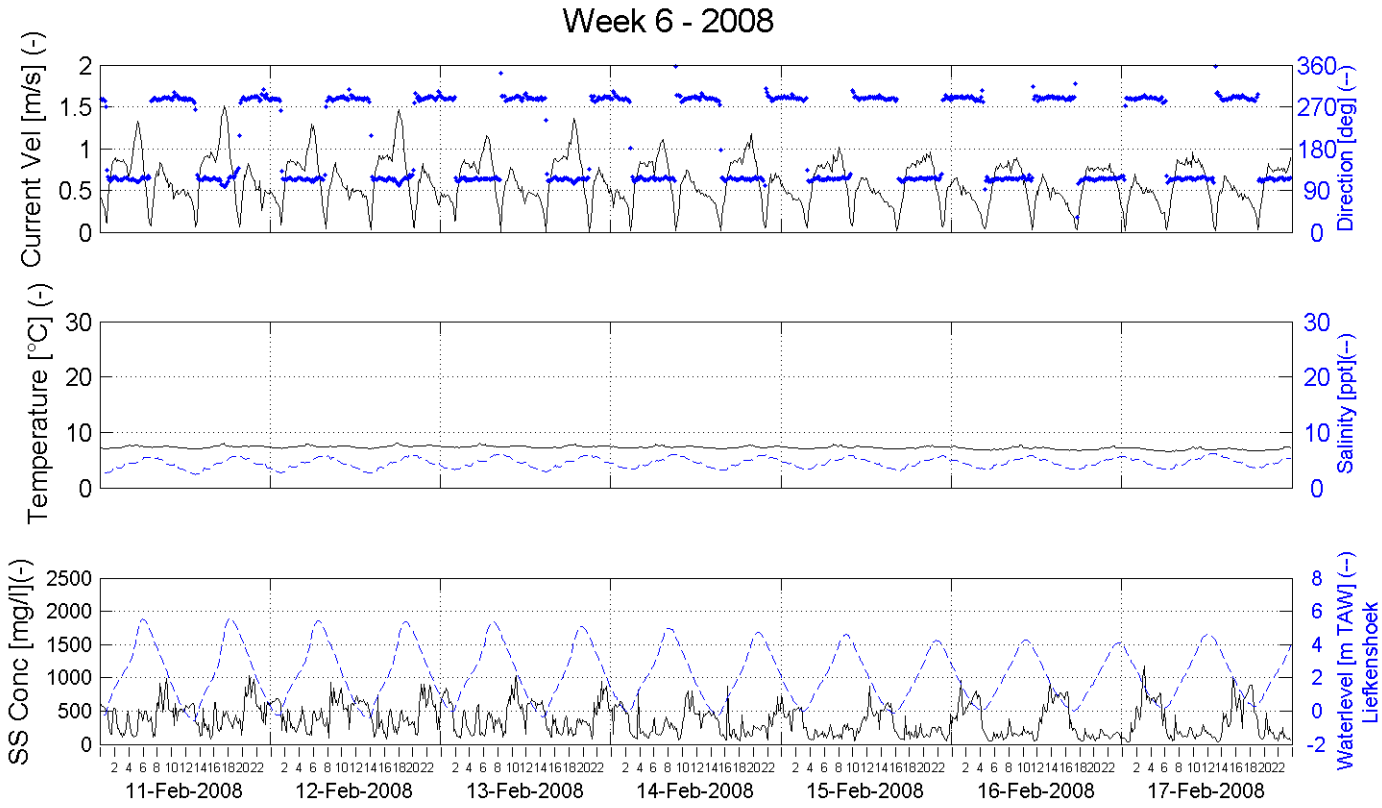
Processed by:

IMDC

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Buoy 97 top - 3.3m above bottom (-4.8m TAW)

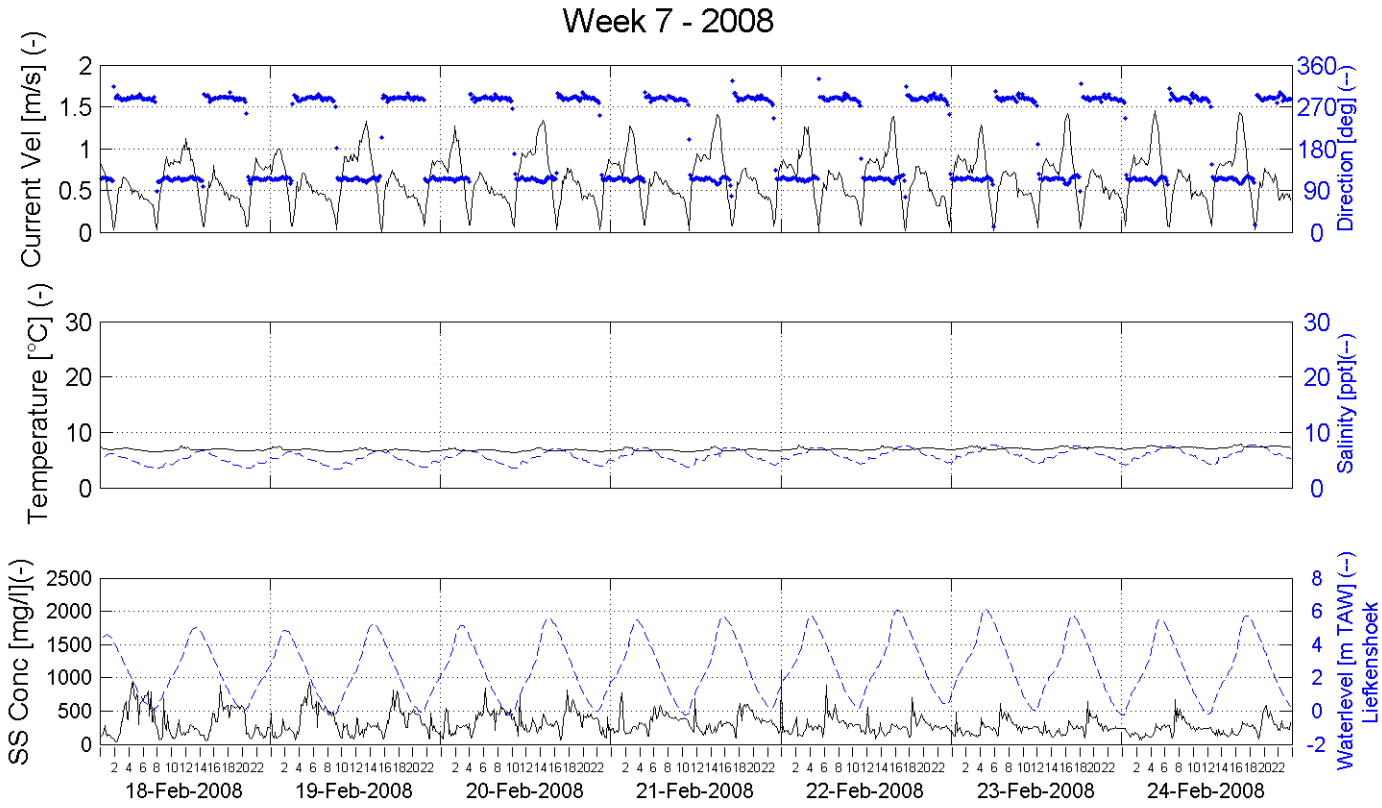
Processed by:

IMDC

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Buoy 97 top - 3.3m above bottom (-4.8m TAW)

Processed by:

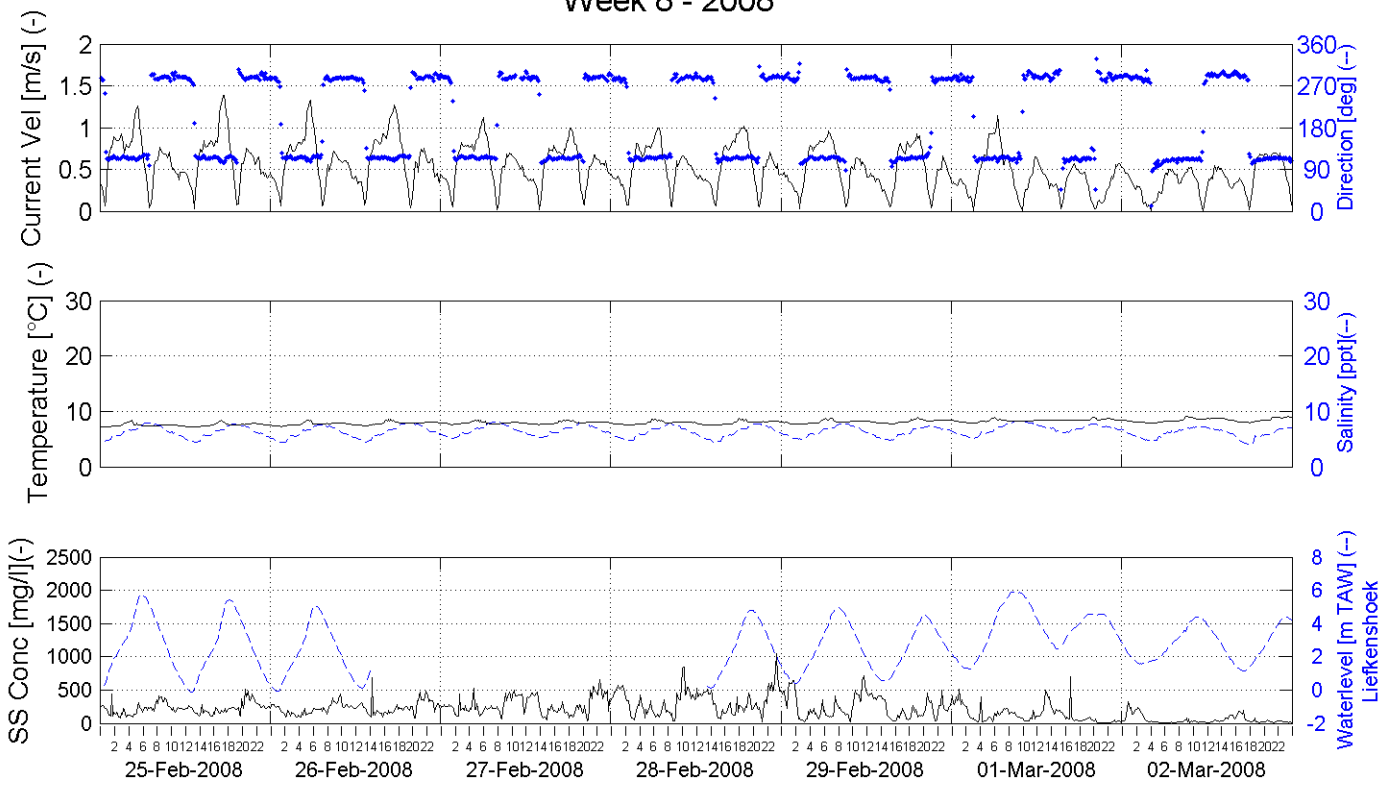
IMDC

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008

Week 8 - 2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Buoy 97 top - 3.3m above bottom (-4.8m TAW)

Processed by:

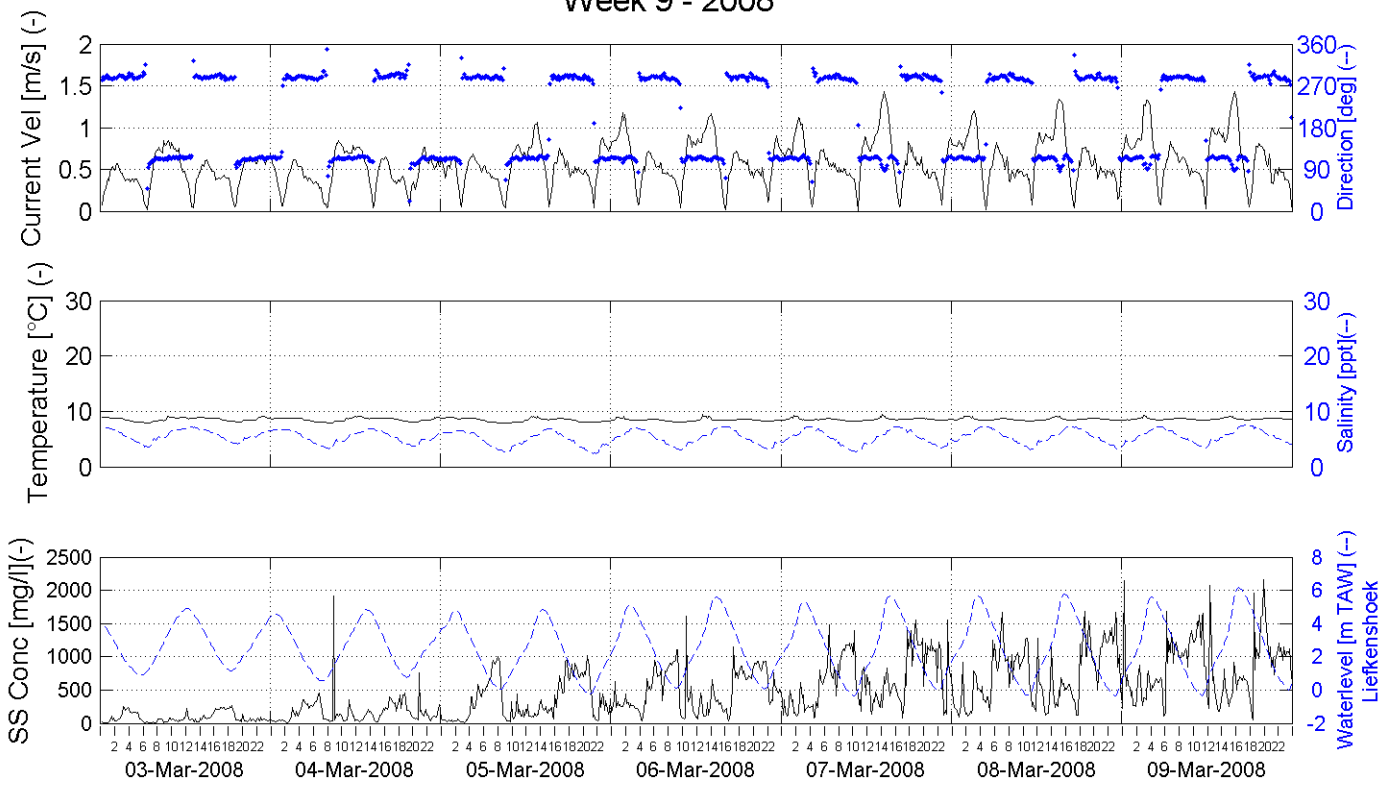
IMDC

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008

Week 9 - 2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Buoy 97 top - 3.3m above bottom (-4.8m TAW)

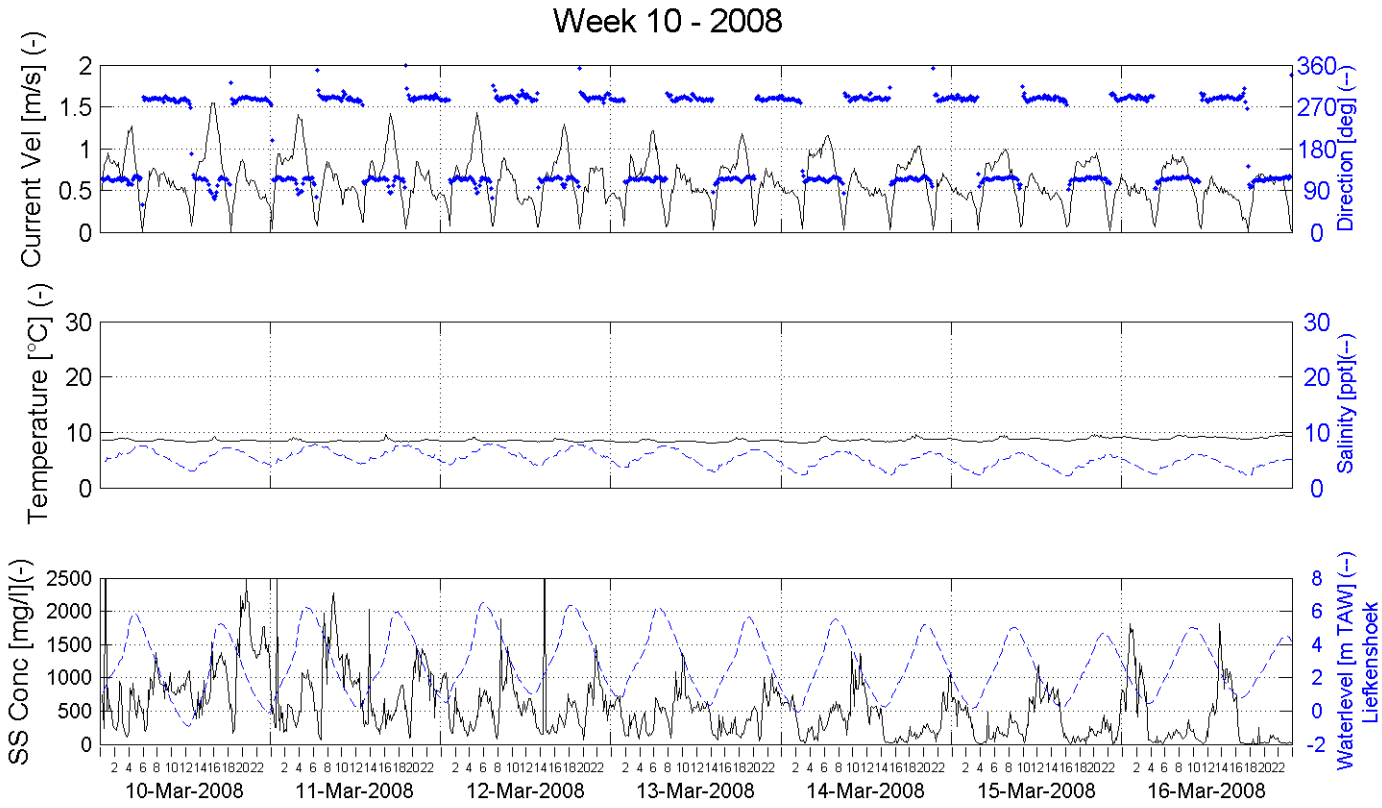
Processed by:

IMDC

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Buoy 97 top - 3.3m above bottom (-4.8m TAW)

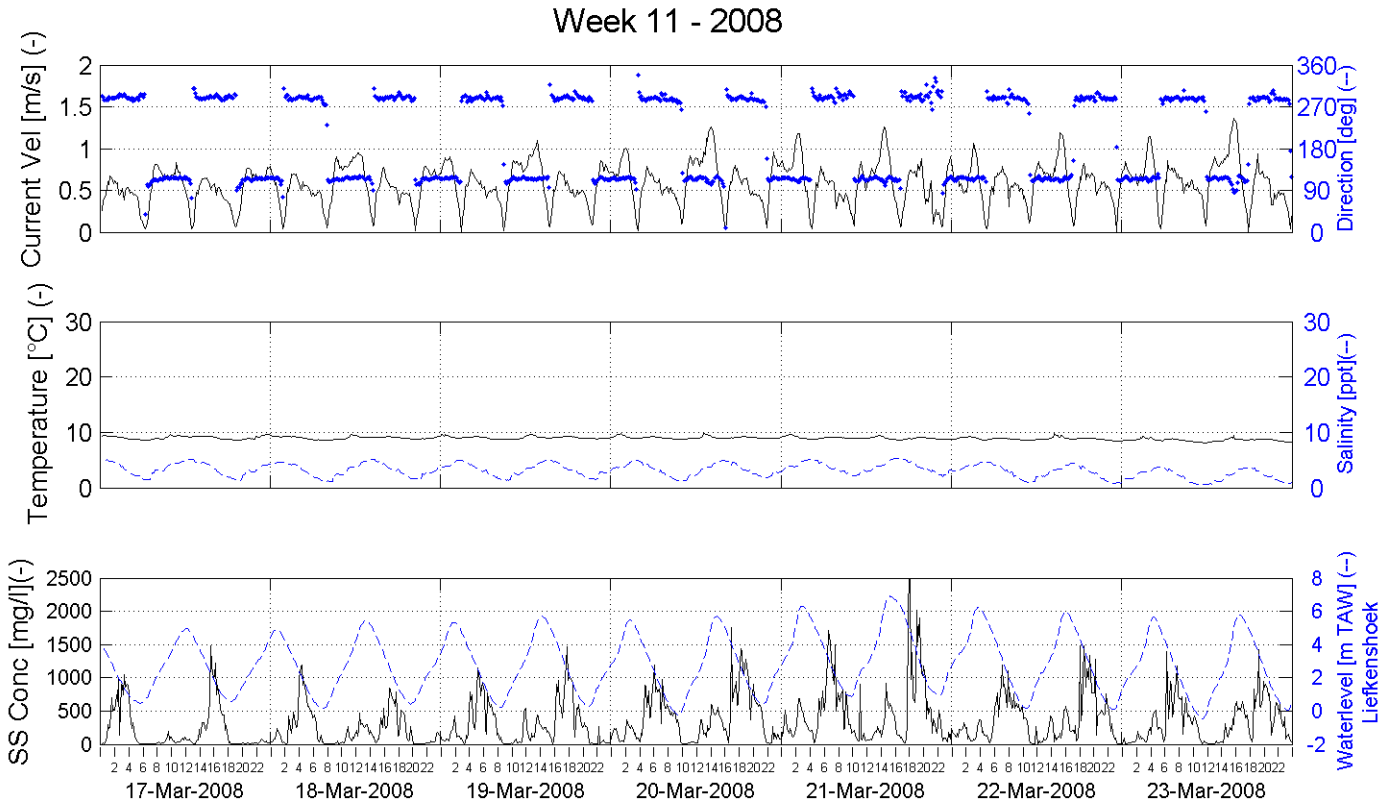
Processed by:

IMDC

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Buoy 97 top - 3.3m above bottom (-4.8m TAW)

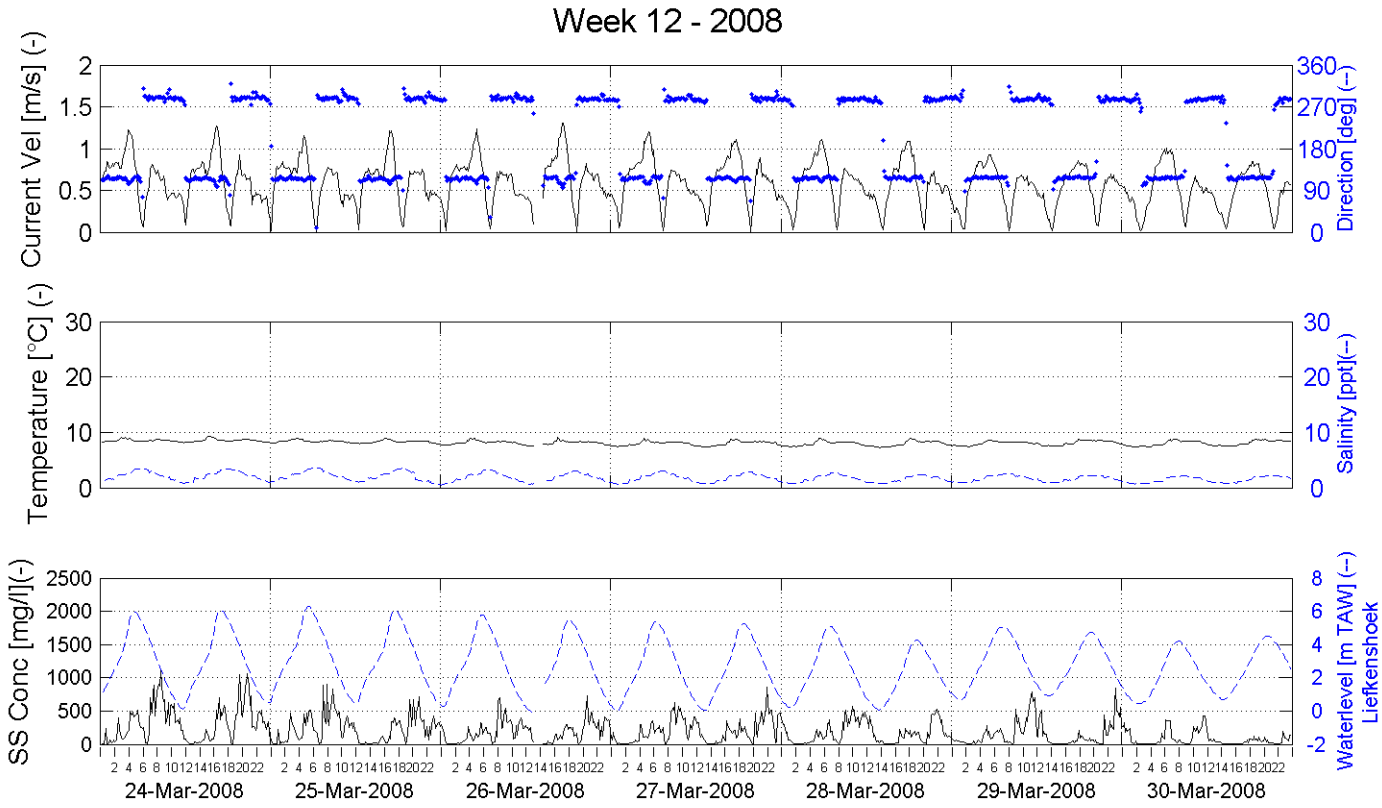
Processed by:

IMDC

In Association with:

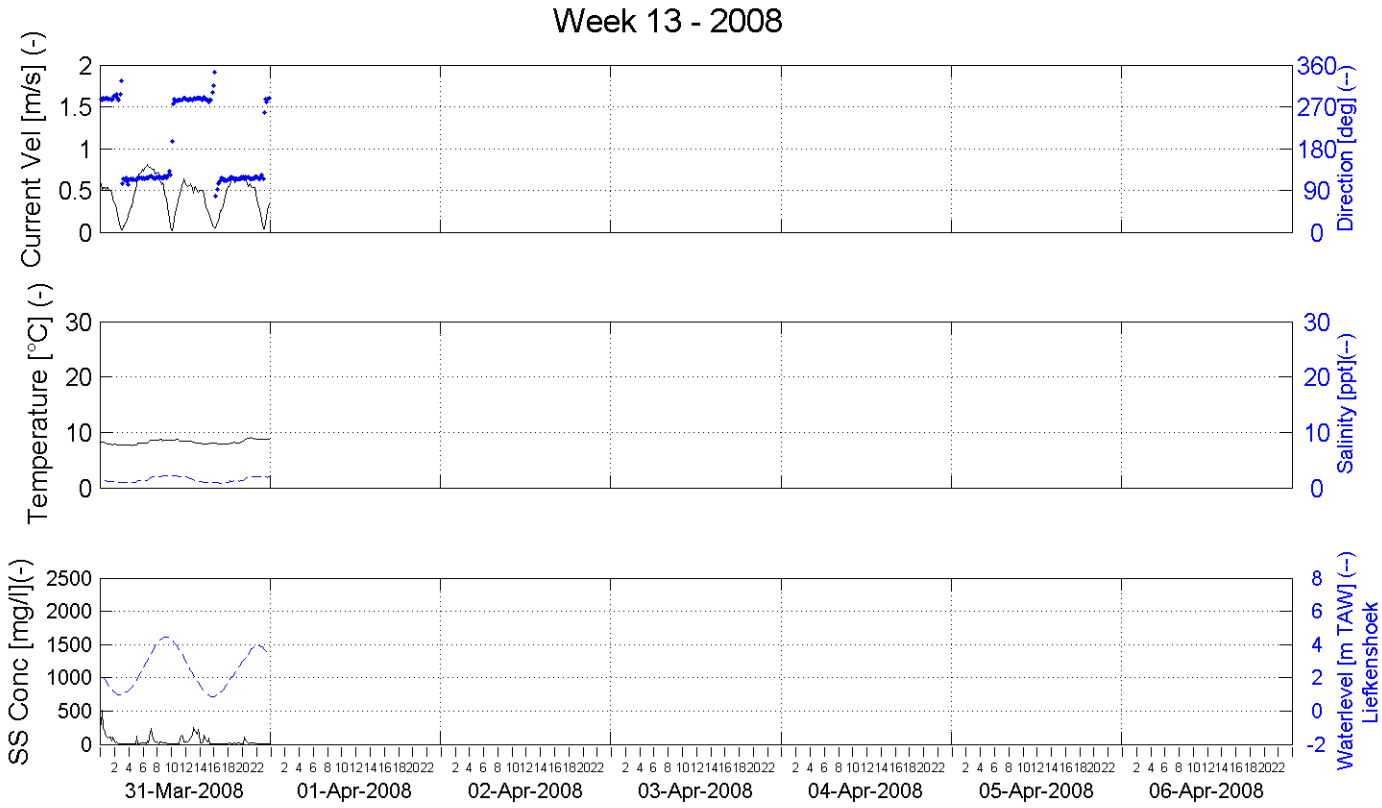
I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide	Processed by: IMDC
Location: Buoy 97 top - 3.3m above bottom (-4.8m TAW)	In Association with: I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Buoy 97 top - 3.3m above bottom (-4.8m TAW)

Processed by:

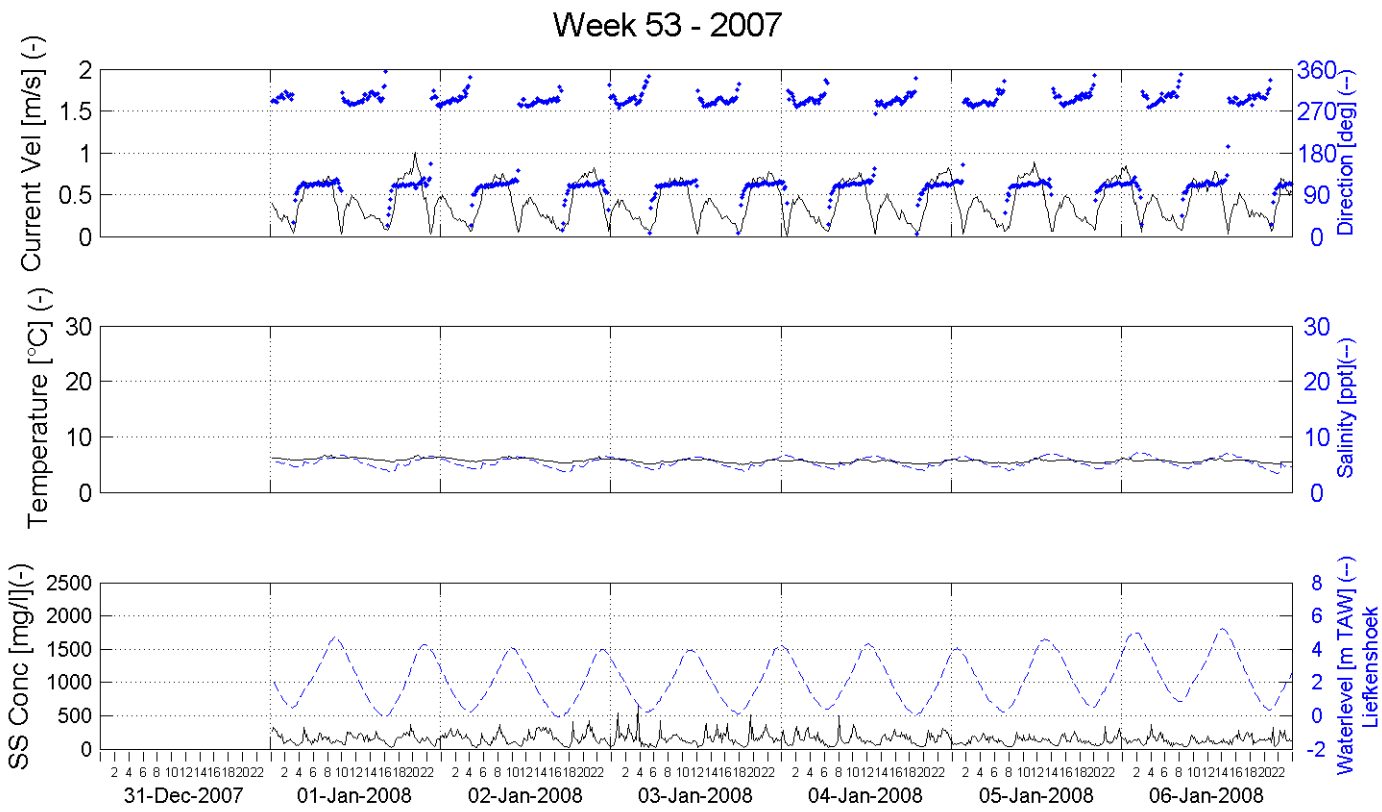
IMDC

In Association with:

I/RA/11283/07.100/MSA

B.1.4. Buoy 97 bottom

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Buoy 97 bottom - 0.8m above bottom (-7.2m TAW)

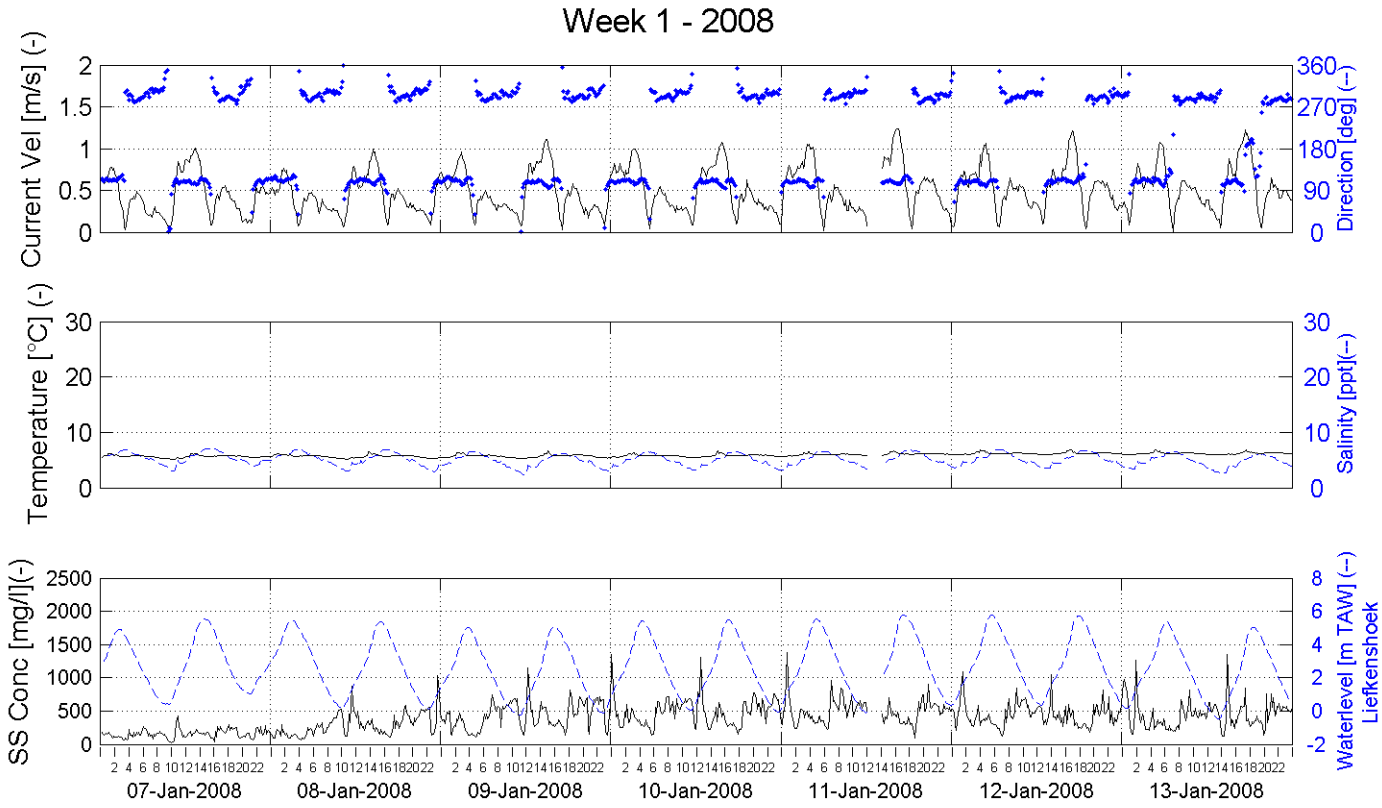
Processed by:

IMDC

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Buoy 97 bottom - 0.8m above bottom (-7.2m TAW)

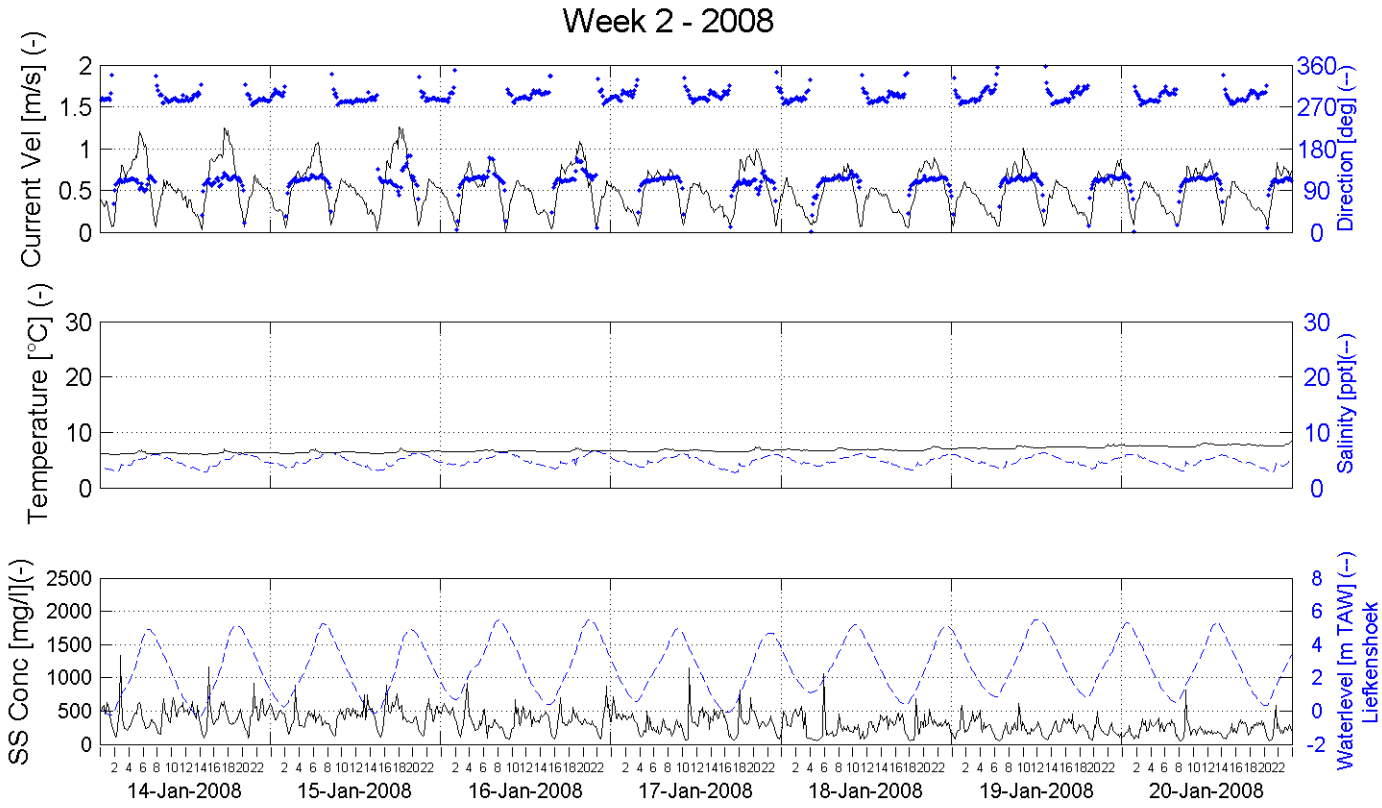
Processed by:

IMDC

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Buoy 97 bottom - 0.8m above bottom (-7.2m TAW)

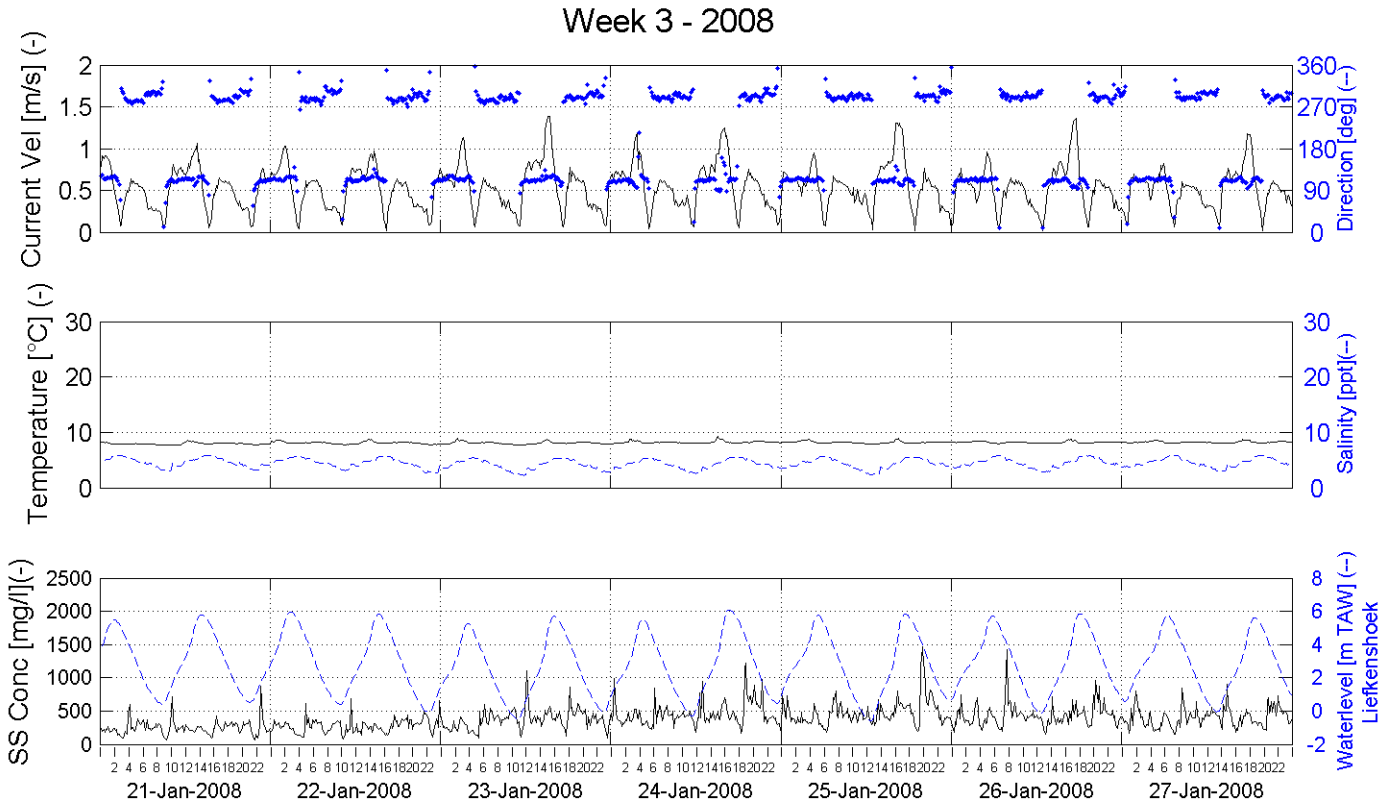
Processed by:

IMDC

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Buoy 97 bottom - 0.8m above bottom (-7.2m TAW)

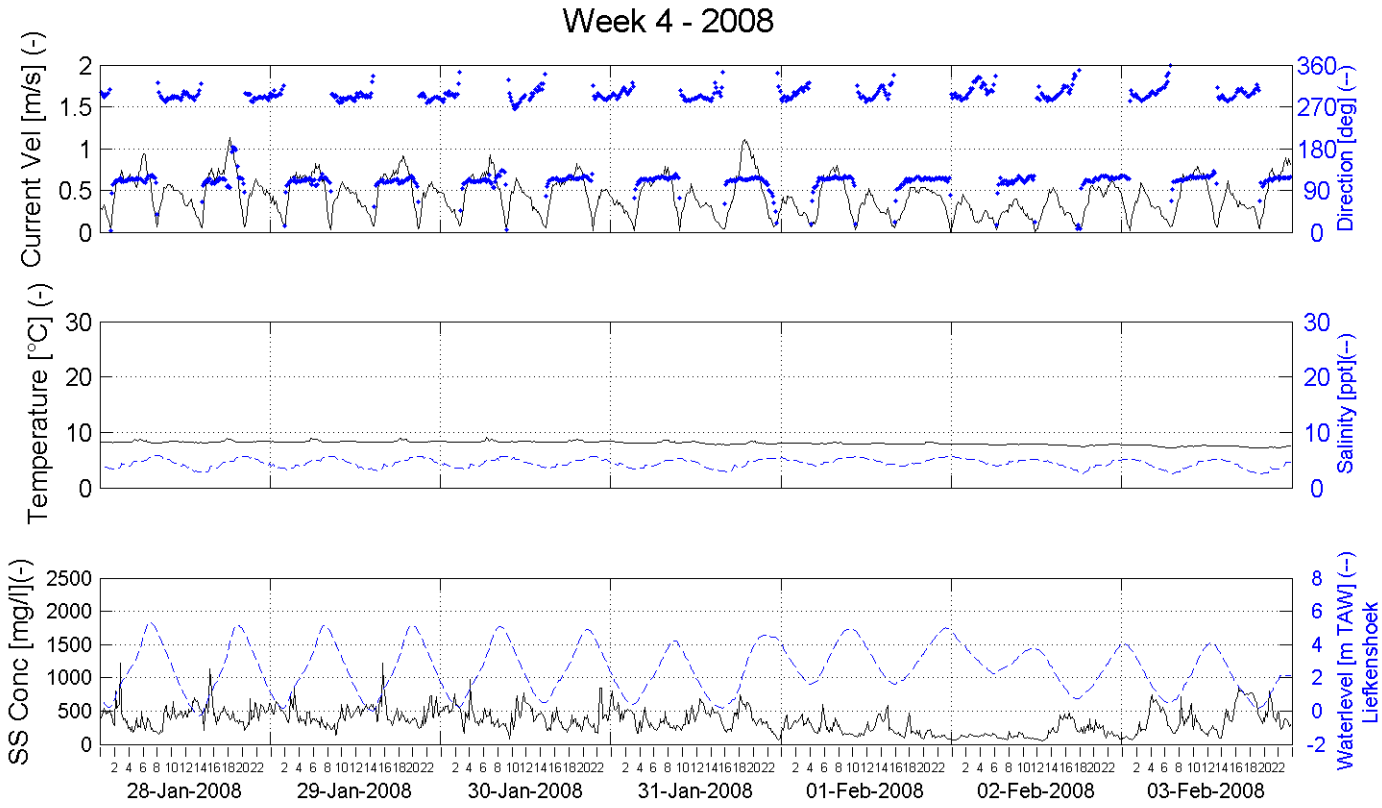
Processed by:

IMDC

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Buoy 97 bottom - 0.8m above bottom (-7.2m TAW)

Processed by:

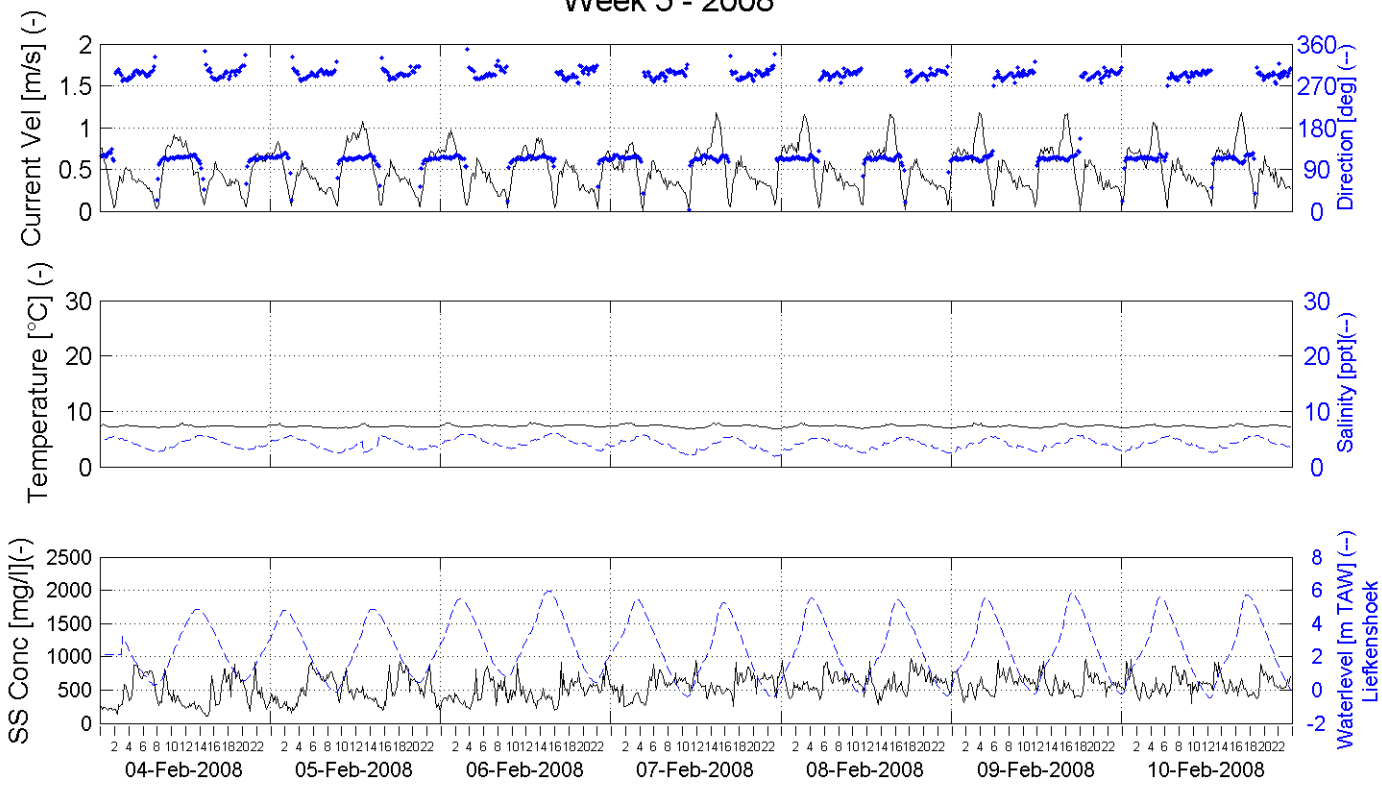
IMDC

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008

Week 5 - 2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Buoy 97 bottom - 0.8m above bottom (-7.2m TAW)

Processed by:

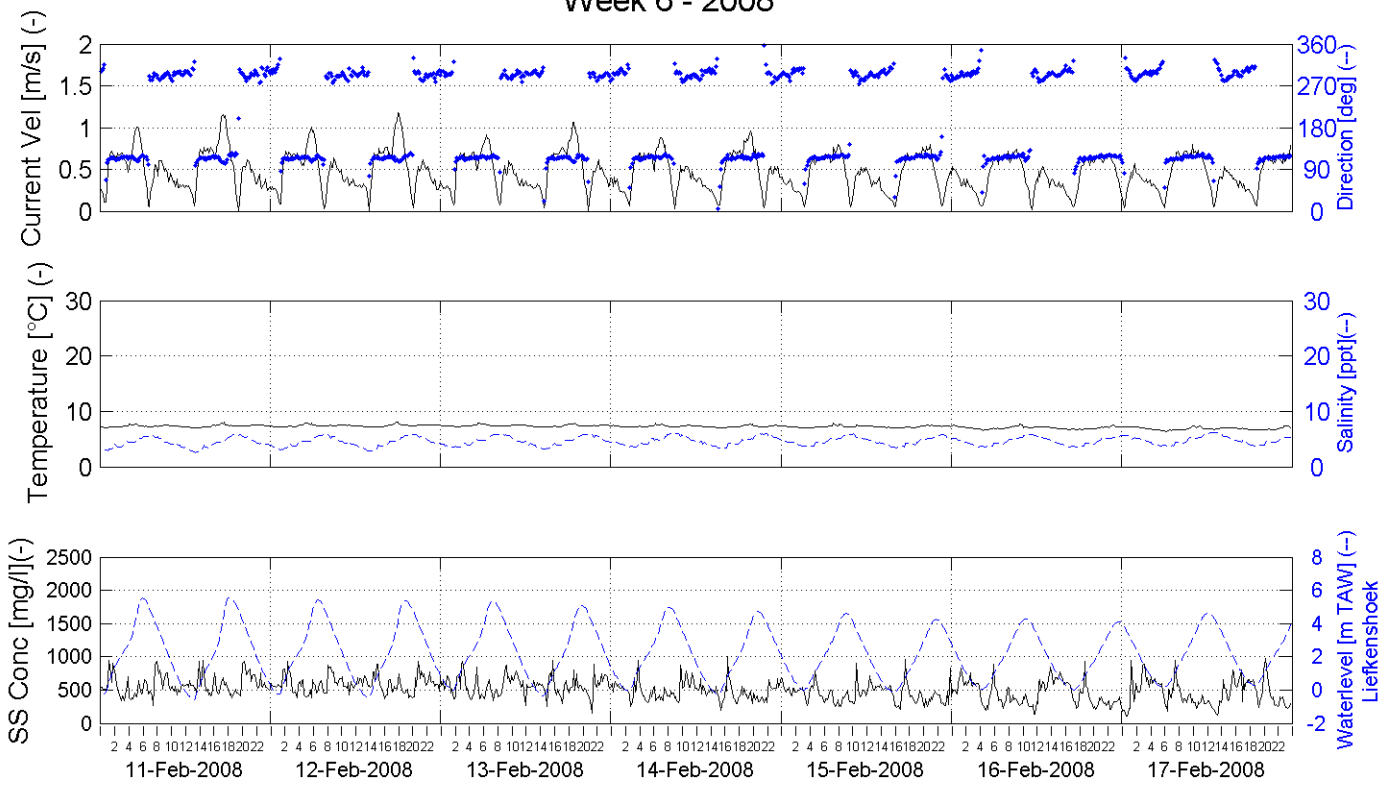
IMDC

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008

Week 6 - 2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Buoy 97 bottom - 0.8m above bottom (-7.2m TAW)

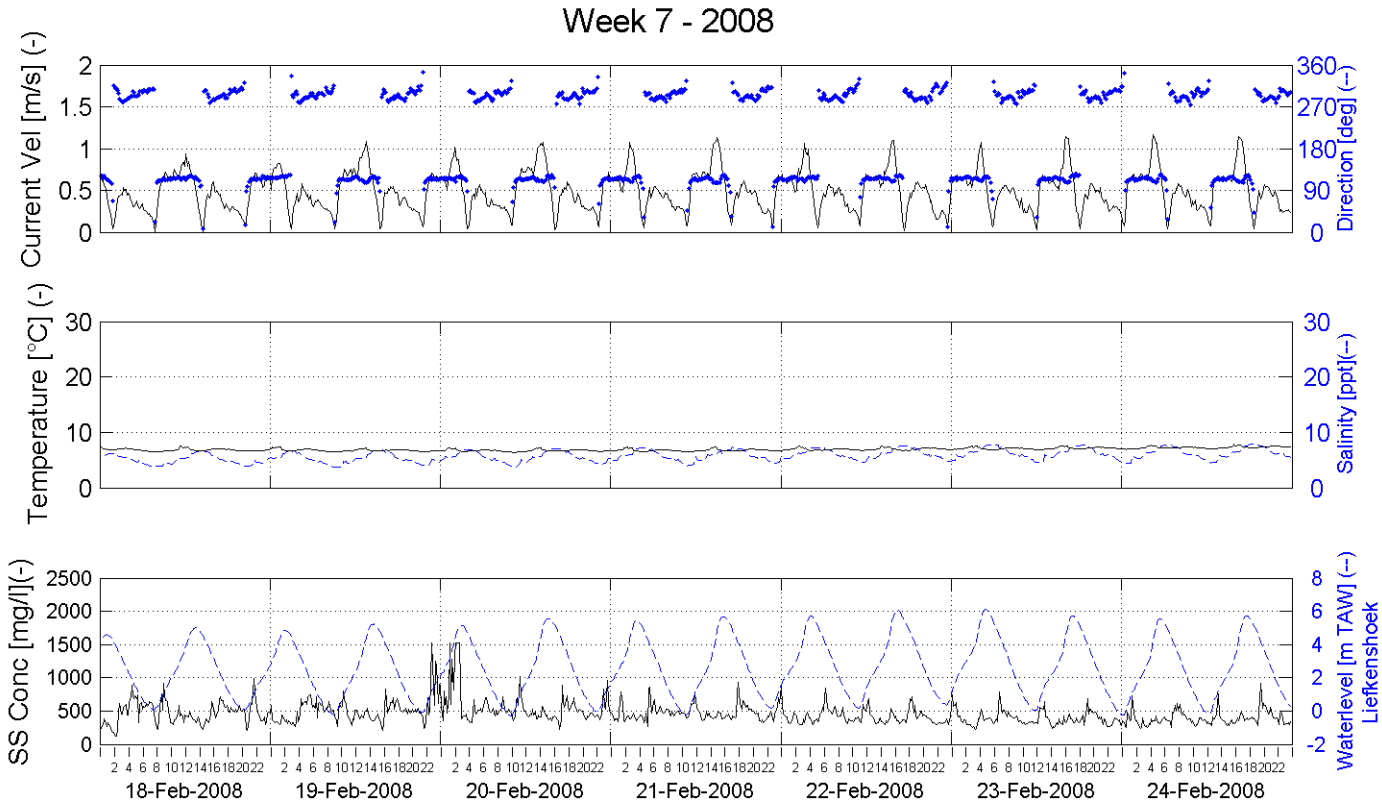
Processed by:

IMDC

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Buoy 97 bottom - 0.8m above bottom (-7.2m TAW)

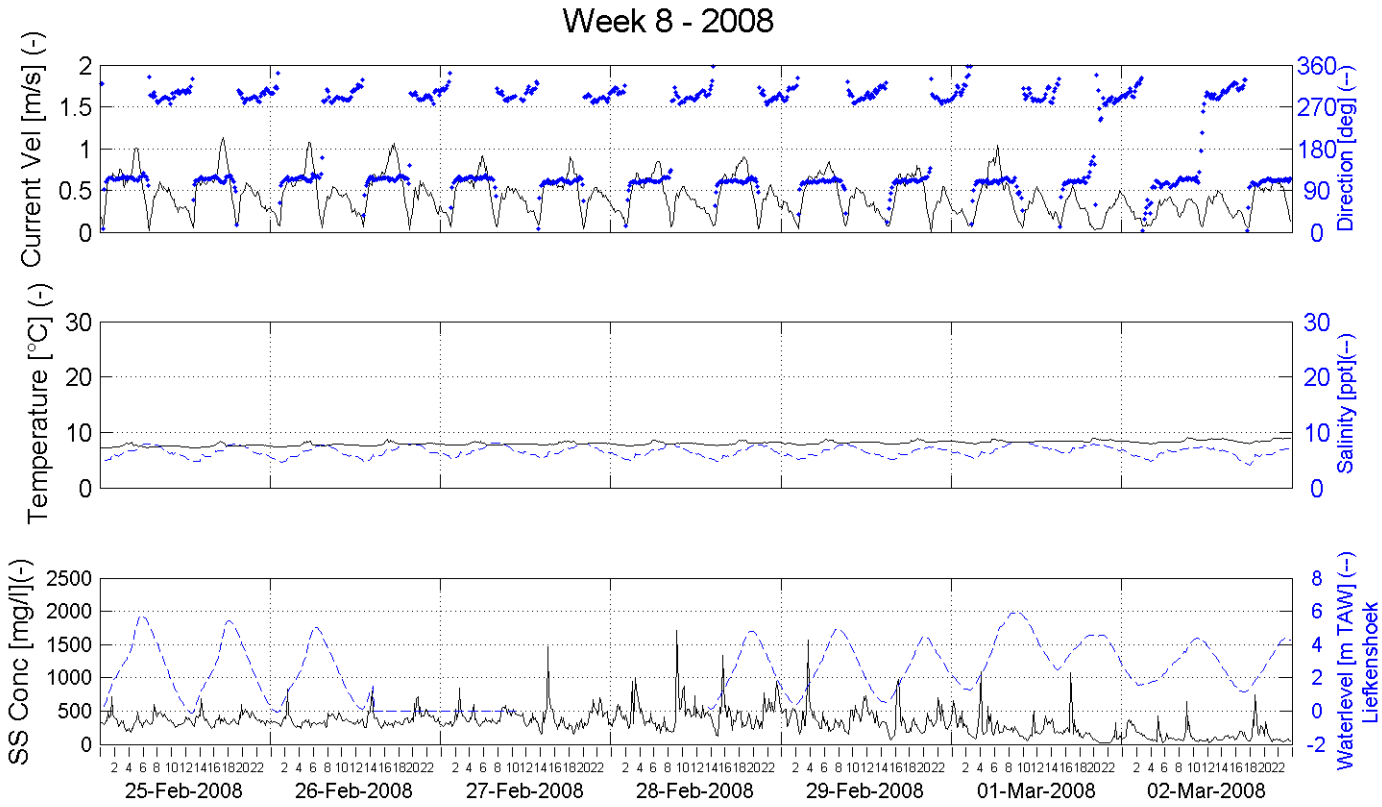
Processed by:

IMDC

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

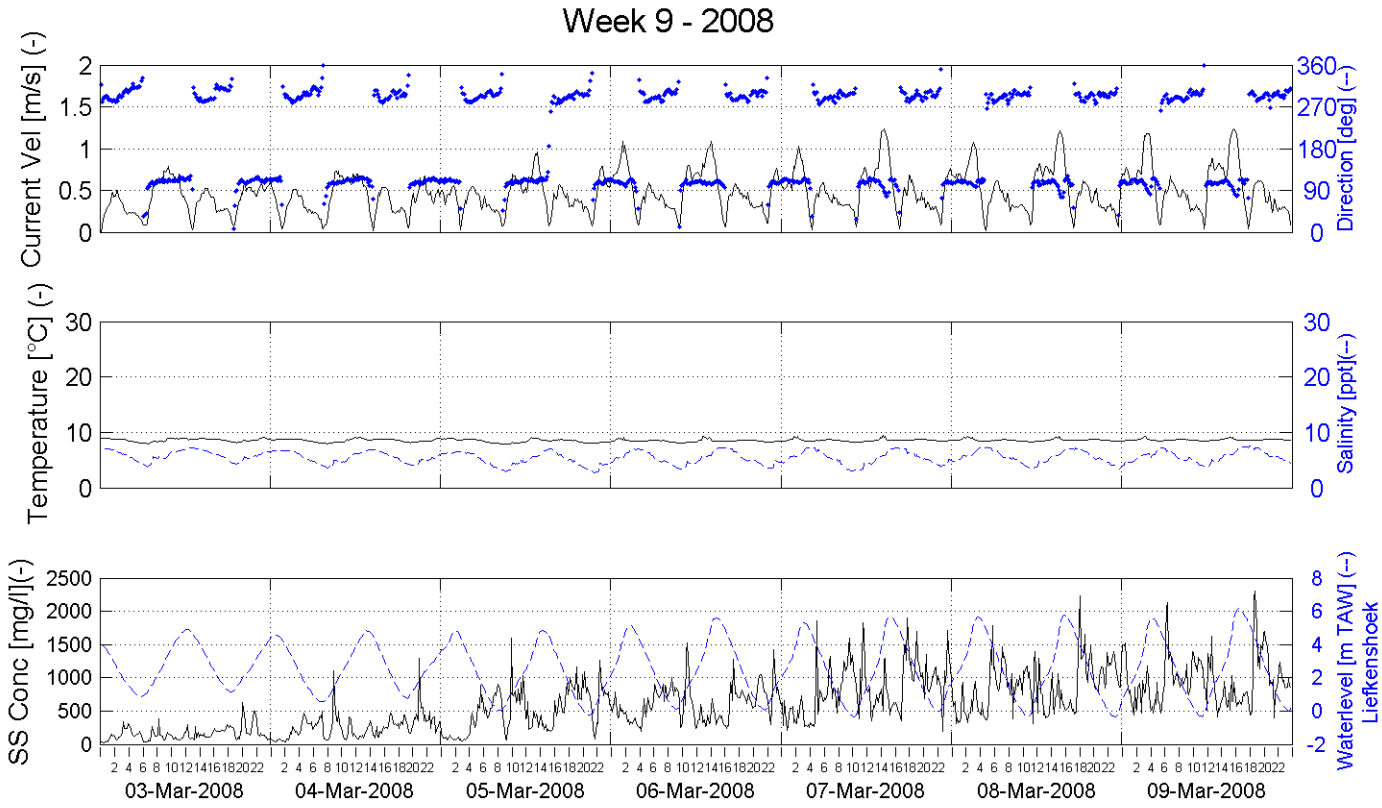
Buoy 97 bottom - 0.8m above bottom (-7.2m TAW)

Processed by:

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Buoy 97 bottom - 0.8m above bottom (-7.2m TAW)

Processed by:

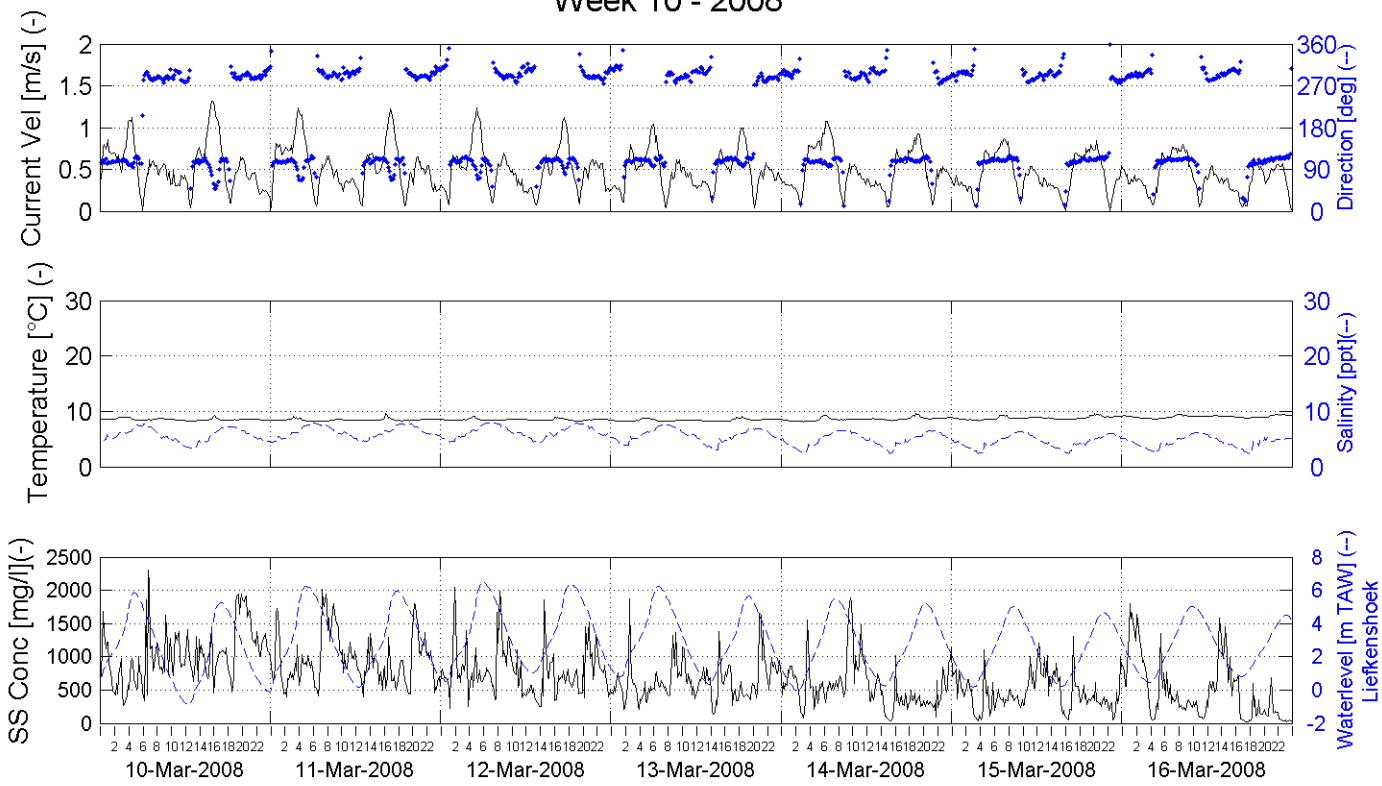
IMDC

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008

Week 10 - 2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Buoy 97 bottom - 0.8m above bottom (-7.2m TAW)

Processed by:

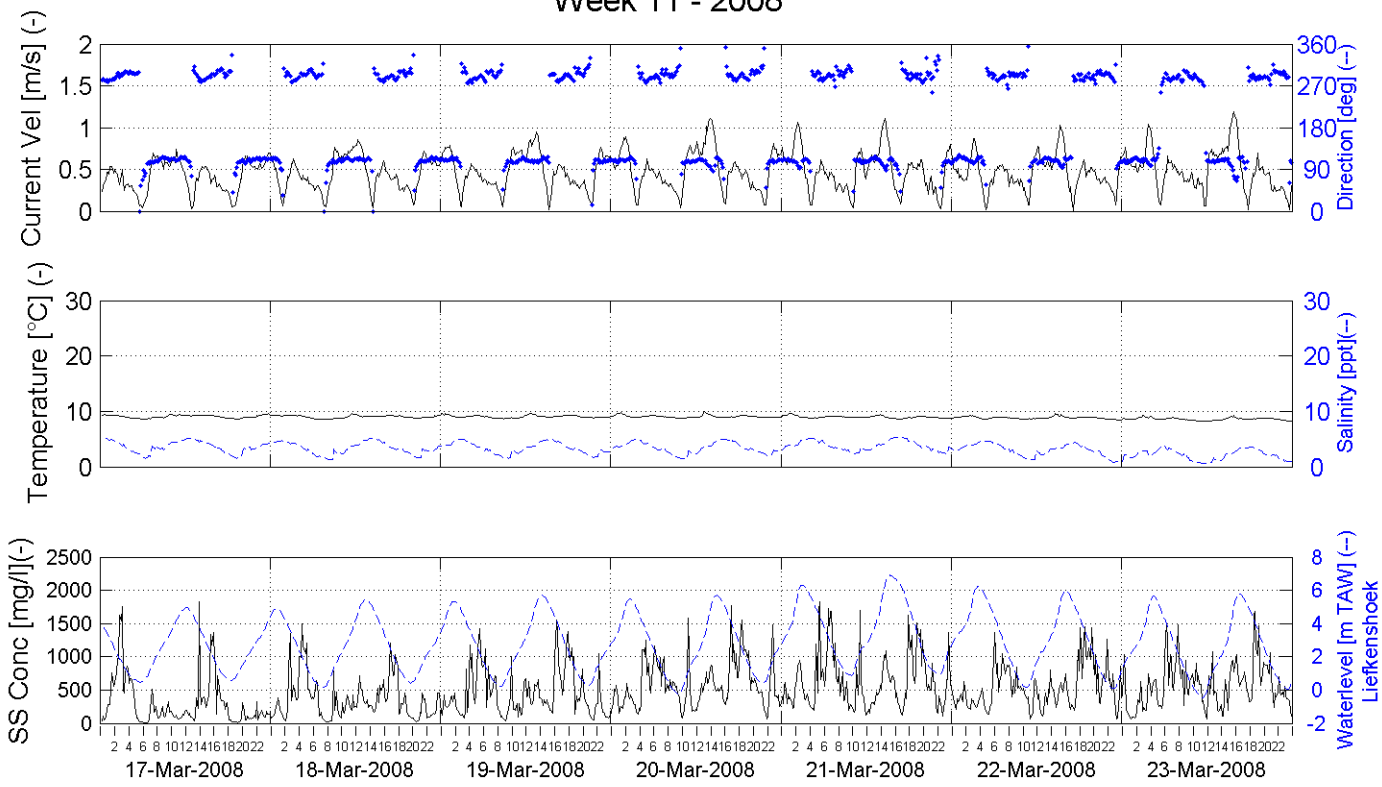
IMDC

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008

Week 11 - 2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Buoy 97 bottom - 0.8m above bottom (-7.2m TAW)

Processed by:

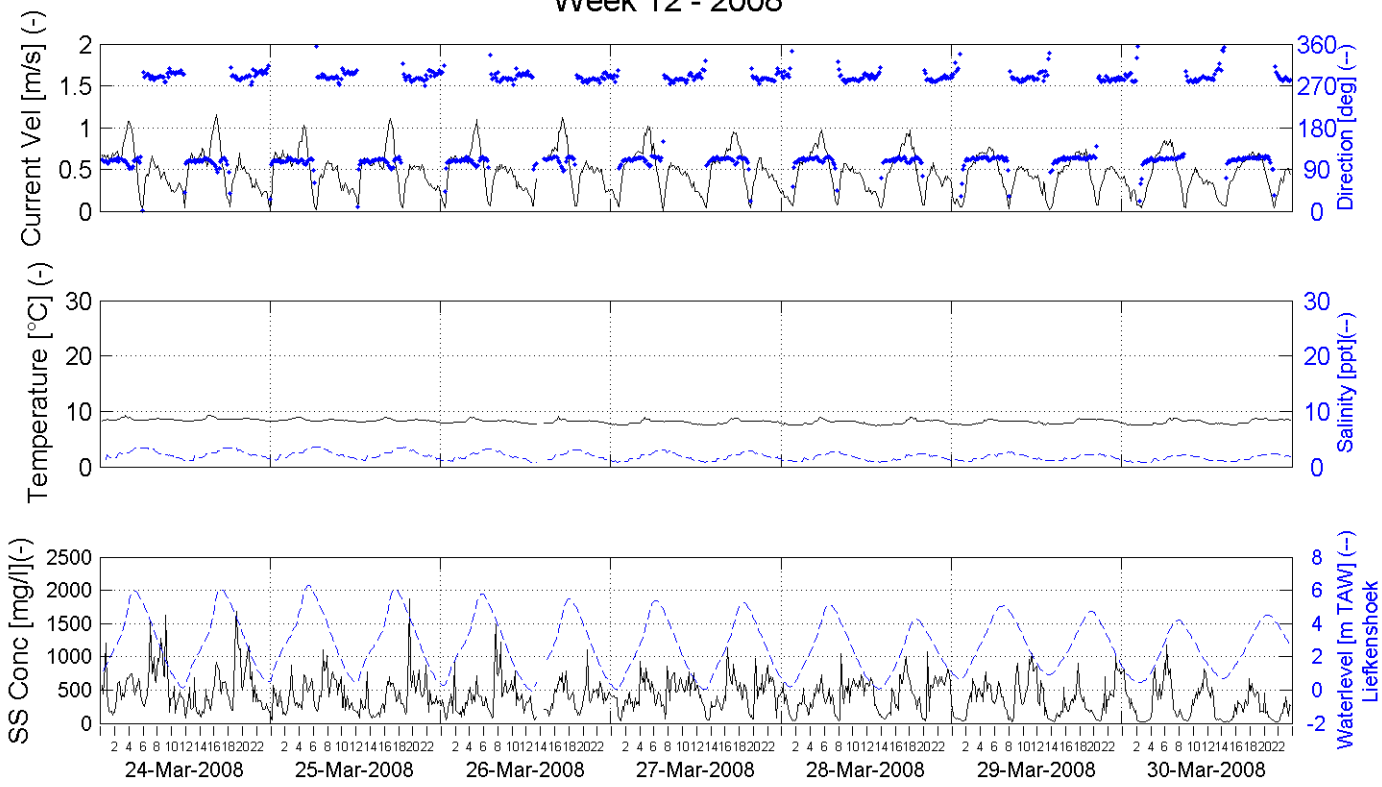
IMDC

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008

Week 12 - 2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Buoy 97 bottom - 0.8m above bottom (-7.2m TAW)

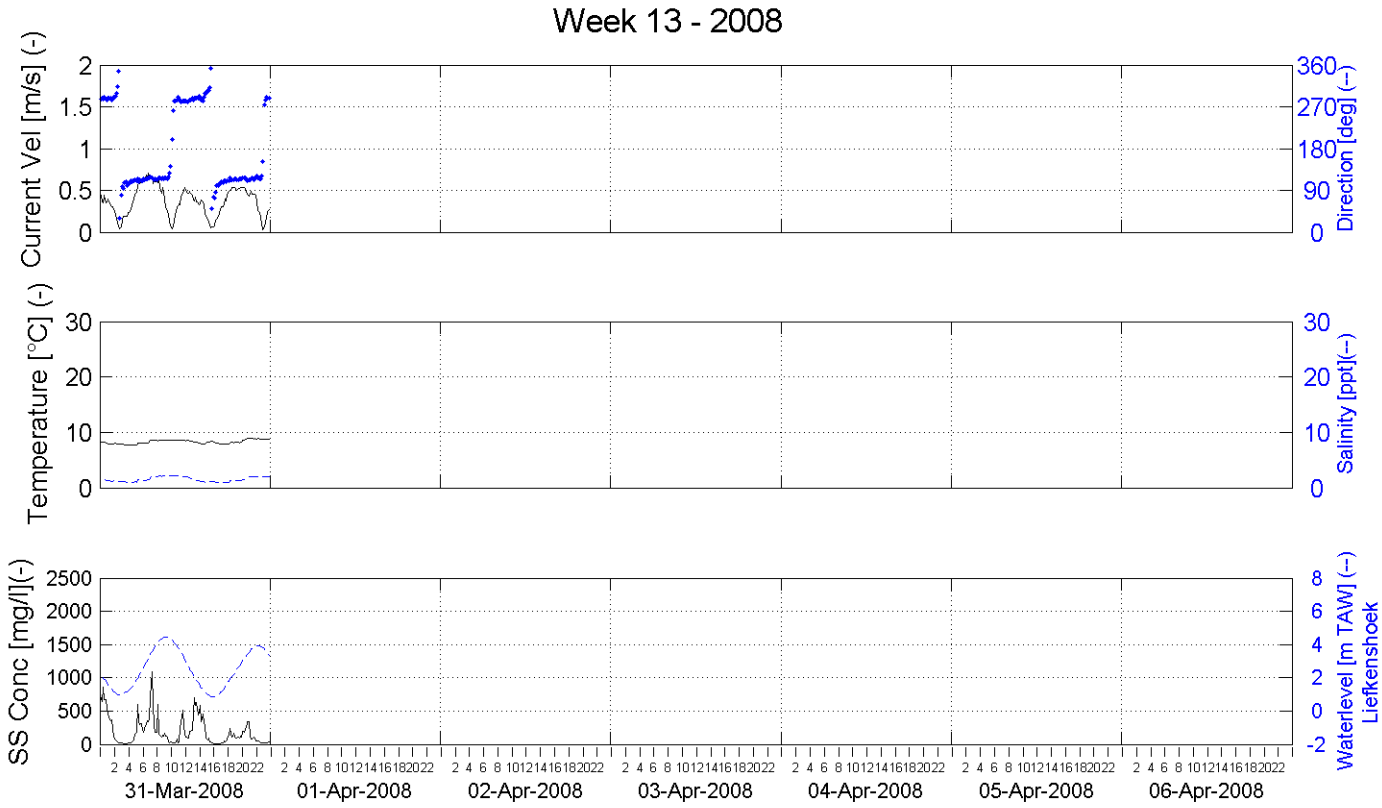
Processed by:

IMDC

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Buoy 97 bottom - 0.8m above bottom (-7.2m TAW)

Processed by:

IMDC

In Association with:

I/RA/11283/07.100/MSA

B.2 Monthly results minimum, maximum and average of velocity magnitude, temperature, salinity and suspended sediment concentration

Location: Buoy 84
3.3 meter above bottom [-6.0 m TAW]

Velocity magnitude [m/s]			
Month	***Minimum***	***Maximum***	***Average***
April 2007	0.01*	1.28*	0.56*
May 2007	0.00	1.26	0.53
June 2007	0.00	1.27	0.52
July 2007	0.01	1.19	0.52
August 2007	0.00	1.27	0.50
September 2007	0.00	1.34	0.49
October 2007	0.00	1.56	0.5
November 2007	0.00	1.43	0.51
December 2007	0.01	1.52	0.53
January 2008	0.01	1.38	0.51
February 2008	0.00	1.15	0.4
March 2008	0.00	1.45	0.5
Temperature [°C]			
Month	***Minimum***	***Maximum***	***Average***
April 2007	10.1*	12.8*	11.1*
May 2007	16.0	18.6	17.2
June 2007	17.5	21.6	20.1
July 2007	18.5	21.0	19.8
August 2007	19.5	21.4	20.4
September 2007	16.6	20.3	18.5
October 2007	12.9	17.3	15.6
November 2007	8.5	13.7	11.1
December 2007	5.4	9.3	7.4
January 2008	5.2	8.6	6.8
February 2008	6.3	8.6	7.2
March 2008	7.2	9.6	8.5

-: No data or less than 30% of the monthly data available.
*: Less than 70% of the monthly data available.

Salinity [ppt]						
Month	***Minimum***		***Maximum***		***Average***	
	HW	***LW***	***HW***	***LW***	***HW***	***LW***
April 2007	6.0*	3.7*	7.6*	5.6*	7.1*	4.8*
May 2007	11.4	8.8	12.7	9.8	12.1	9.3
June 2007	11.1	8.5	13.7	10.5	12.5	9.6
July 2007	9.8	6.8	12.8	9.7	11.2	8.5
August 2007	6.3	8.1	12.9	9.4	11.6	8.7
September 2007	11.5	9.2	15.1	11.7	13.5	10.7
October 2007	12.5	9.9	15.6	11.9	13.9	10.7
November 2007	11.0	7.5	15.9	12.4	12.9	9.7
December 2007	4.8	2.4	12	9.1	7.4	4.8
January 2008	-	-	-	-	-	-
February 2008	-	-	-	-	-	-
March 2008	2.8	1.6	10.4	10.2	7	4.4

Suspended sediment concentration [mg/l]			
Month	***Minimum***	***Maximum***	***Average***
April 2007	28*	1055*	243*
May 2007	12	494	122
June 2007	2	377	101
July 2007	9	408	122
August 2007	15	846	190
September 2007	12	850	174
October 2007	8	532	142
November 2007	29	803	231
December 2007	33	695	226
January 2008	25	751	204
February 2008	29	1639	505
March 2008	7	1599	261

-: No data or less than 30% of the monthly data available.
*: Less than 70% of the monthly data available.

Location: Buoy 84
0.8 meter above bottom [-8.0 m TAW]

Velocity magnitude [m/s]			
Month	***Minimum***	***Maximum***	***Average***
April 2007	0.01*	1.00*	0.46*
May 2007	0.01	1.20	0.46
June 2007	0.00	1.08	0.45
July 2007	0.01	1.19	0.46
August 2007	0.01	1.18	0.44
September 2007	-	-	-
October 2007	0.01*	1.29*	0.44*
November 2007	0.01	1.17	0.44
December 2007	0.01	1.21	0.44
January 2008	0.01*	1.12*	0.43*
February 2008	-	-	-
March 2008	0	1.27	0.31
Temperature [°C]			
Month	***Minimum***	***Maximum***	***Average***
April 2007	10.0*	12.8*	11.1*
May 2007	16.0	18.6	17.2
June 2007	17.6	21.7	20.1
July 2007	18.6	21.1	19.9
August 2007	19.5	21.4	20.4
September 2007	-	-	-
October 2007	12.9*	17.0*	15.1*
November 2007	8.5	13.7	11.1
December 2007	5.4	9.8	7.5
January 2008	5.2*	7.0*	5.8*
February 2008	-	-	-
March 2008	7.8	9.5	8.6

-: No data or less than 30% of the monthly data available.
*: Less than 70% of the monthly data available.

Salinity [ppt]						
Month	***Minimum***		***Maximum***		***Average***	
	HW	***LW***	***HW***	***LW***	***HW***	***LW***
April 2007	5.9*	3.9*	8.0*	5.6*	7.3*	4.9*
May 2007	11.7*	9.2*	14.2*	10.0*	12.8*	9.7*
June 2007	11.3	8.3	15.4	11.2	13.1	10.1
July 2007	9.9	6.8	15.0	11.2	12.3	9.1
August 2007	10.2	6.9	14.4	9.9	11.4	8.5
September 2007	-	-	-	-	-	-
October 2007	-	-	-	-	-	-
November 2007	-	-	-	-	-	-
December 2007	-	-	-	-	-	-
January 2008	-	-	-	-	-	-
February 2008	-	-	-	-	-	-
March 2008	2.7	1.7	9.8	7.5	6.2	4.1

Suspended sediment concentration [mg/l]			
Month	***Minimum***	***Maximum***	***Average***
April 2007	31*	1889*	463*
May 2007	14	852	209
June 2007	1	808	170
July 2007	30	1540	200
August 2007	33	802	272
September 2007	-	-	-
October 2007	22*	596*	204*
November 2007	30	1798	320
December 2007	44	1093	321
January 2008	13*	1797*	229*
February 2008	-	-	-
March 2008	2	672	410

-: No data or less than 30% of the monthly data available.
*: Less than 70% of the monthly data available.

Location: Buoy 97
3.3 meter above bottom [-4.8 m TAW]

Velocity magnitude [m/s]			
Month	***Minimum***	***Maximum***	***Average***
April 2007	0.01	1.45	0.61
May 2007	0.01	1.35	0.60
June 2007	0.01	1.32	0.59
July 2007	0.00	1.45	0.59
August 2007	0.00	1.46	0.59
September 2007	0.00	1.68	0.58
October 2007	0.00	1.51	0.58
November 2007	0.01*	1.41*	0.63*
December 2007	0.00	1.49	0.56
January 2008	0.00	1.70	0.59
February 2008	0.00	1.51	0.59
March 2008	0.01	1.55	0.57
Temperature [°C]			
Month	***Minimum***	***Maximum***	***Average***
April 2007	10.0	17.7	14.3
May 2007	16.3	18.7	17.3
June 2007	17.7	21.9	20.2
July 2007	18.7	21.2	20.0
August 2007	19.6	21.5	20.5
September 2007	16.9	20.7	18.6
October 2007	12.8	17.6	15.7
November 2007	8.5	14.0	11.1
December 2007	5.3	9.4	7.5
January 2008	5.0	9.3	6.9
February 2008	6.4	8.9	7.4
March 2008	7.3	10.0	8.5

-: No data or less than 30% of the monthly data available.
*: Less than 70% of the monthly data available.

Salinity [ppt]						
Month	***Minimum***		***Maximum***		***Average***	
	HW	***LW***	***HW***	***LW***	***HW***	***LW***
April 2007	5.3	2.4	10.0	7.0	8.2	5.3
May 2007	10.2	6.5	11.3	8.6	10.8	7.4
June 2007	10.5	5.3	12.3	8.7	11.4	7.5
July 2007	8.2	4.2	11.4	7.8	9.9	6.3
August 2007	8.1	4.1	10.5	7.4	9.4	6.0
September 2007	10.2	6.7	12.4	9.2	11.3	8.2
October 2007	10.4	5.9	12.7	9.1	11.5	7.5
November 2007	8.5	3.6	12	8.8	10.5	6.2
December 2007	3.6	0.8	7.1	4.6	5.3	2.5
January 2008	5.2	2.0	7.0	4.5	6.1	3.2
February 2008	5.0	1.8	8.0	5.3	6.4	3.5
March 2008	2.0	0.6	8.2	6.3	5.4	2.4

Suspended sediment concentration [mg/l]			
Month	***Minimum***	***Maximum***	***Average***
April 2007	24	1616	243
May 2007	23	980	154
June 2007	22	540	98
July 2007	33	1970	170
August 2007	25	900	260
September 2007	18	848	219
October 2007	21	744	188
November 2007	34	1084	321
December 2007	30	937	221
January 2008	21	1089	221
February 2008	20	1271	327
March 2008	3	2964	357

-: No data or less than 30% of the monthly data available.
*: Less than 70% of the monthly data available.

Location: Buoy 97
0.8 meter above bottom [-7.2m TAW]

Velocity magnitude [m/s]			
Month	***Minimum***	***Maximum***	***Average***
April 2007	0.01	1.29	0.50
May 2007	0.00	1.23	0.49
June 2007	0.01	1.18	0.47
October 2007	0.01	1.21	0.47
November 2007	0.01	1.3	0.48
December 2007	0.01	1.24	0.46
January 2008	0.01	1.38	0.49
February 2008	0.01	1.18	0.47
March 2008	0.01	1.32	0.46
Temperature [°C]			
Month	***Minimum***	***Maximum***	***Average***
April 2007	10.0	17.7	14.3
May 2007	16.3	18.7	17.3
June 2007	17.7	21.9	20.2
October 2007	12.8	17.6	15.7
November 2007	8.5	13.9	11.1
December 2007	5.4	9.4	7.5
January 2008	5.0	9.2	6.9
February 2008	6.4	8.9	7.3
March 2008	7.4	10.0	8.6

-: No data or less than 30% of the monthly data available.
*: Less than 70% of the monthly data available.

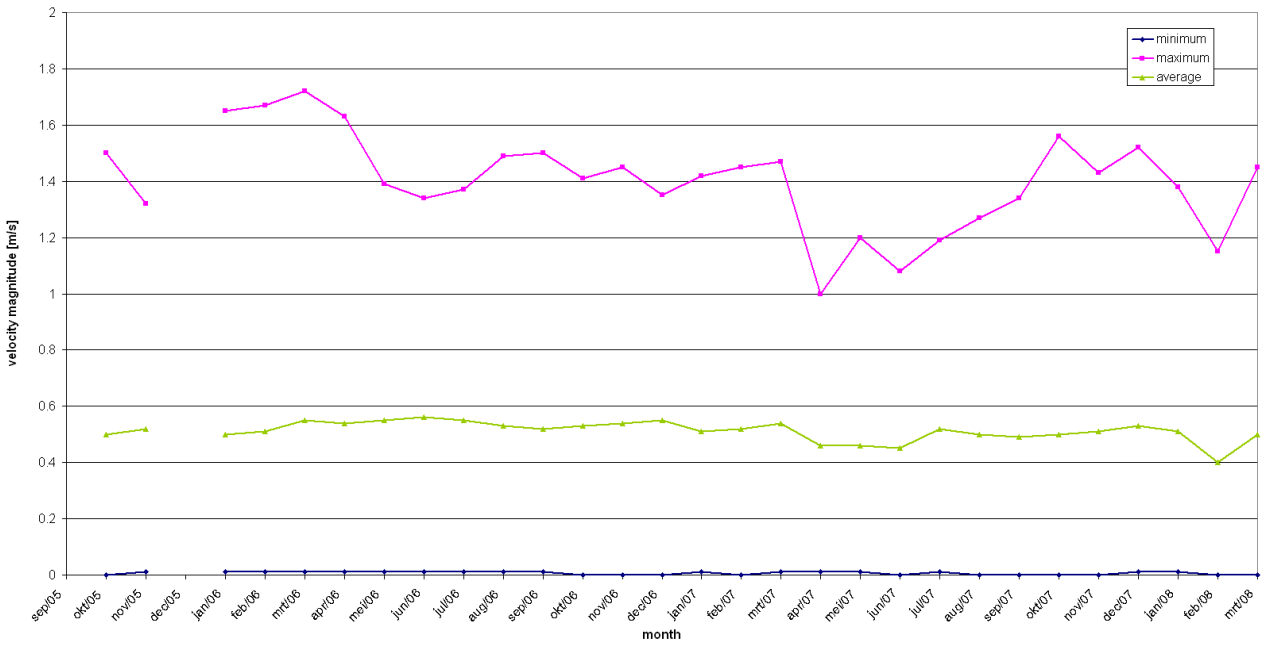
Salinity [ppt]						
Month	***Minimum***		***Maximum***		***Average***	
	HW	***LW***	***HW***	***LW***	***HW***	***LW***
April 2007	5.2	2.8	10.2	7.5	8.3	5.7
May 2007	10.3	7.0	11.4	9.1	10.9	8.0
June 2007	10.4	6.8	12.4	9.3	11.5	8.2
October 2007	10.5	6.7	12.8	9.4	11.5	8.2
November 2007	8.8	4.2	12.8	10.7	10.6	7.0
December 2007	3.6	1.0	10.0	6.7	5.8	3.2
January 2008	5.2	2.4	7.1	5.2	6.1	3.6
February 2008	4.9	1.9	7.9	8.0	6.3	3.9
March 2008	2.0	0.7	8.2	6.6	5.4	2.7

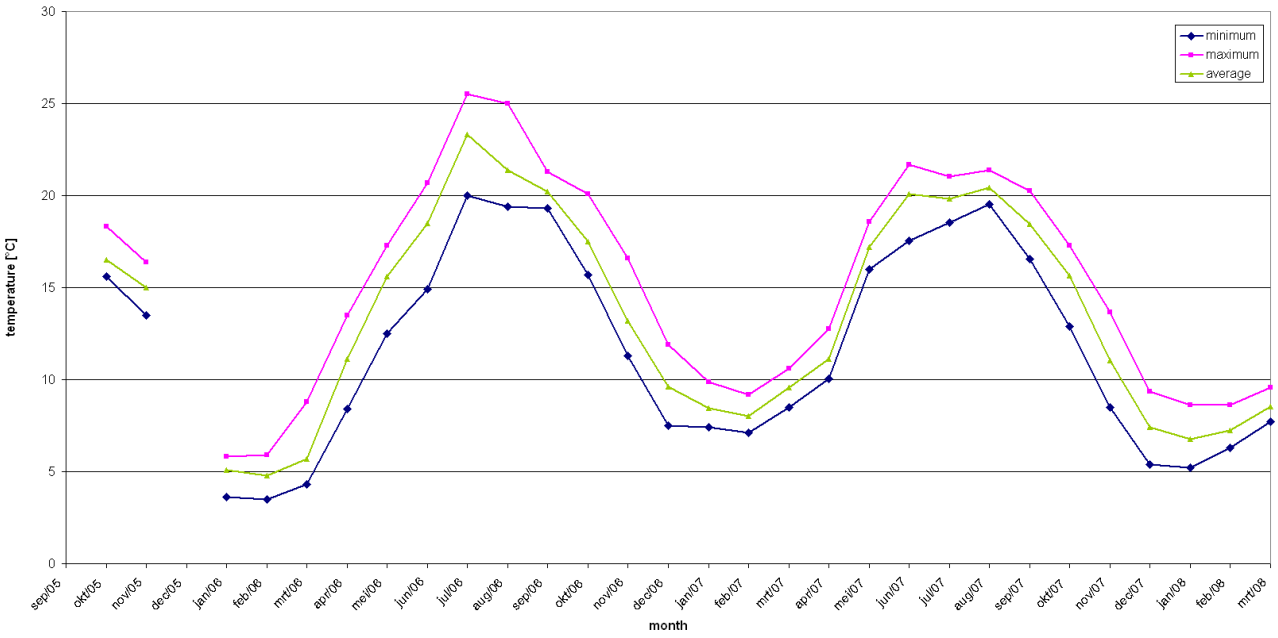
Suspended sediment concentration [mg/l]			
Month	***Minimum***	***Maximum***	***Average***
April 2007	31	1852	444
May 2007	22	1880	368
June 2007	22	2502	211
October 2007	25	1337	182
November 2007	29	1983	417
December 2007	31	2061	337
January 2008	17	1471	329
February 2008	55	1715	460
March 2008	5	2310	514

-: No data or less than 30% of the monthly data available.
*: Less than 70% of the monthly data available.

B.3 Graphs monthly results for the whole deployment period

Velocity magnitude & temperature





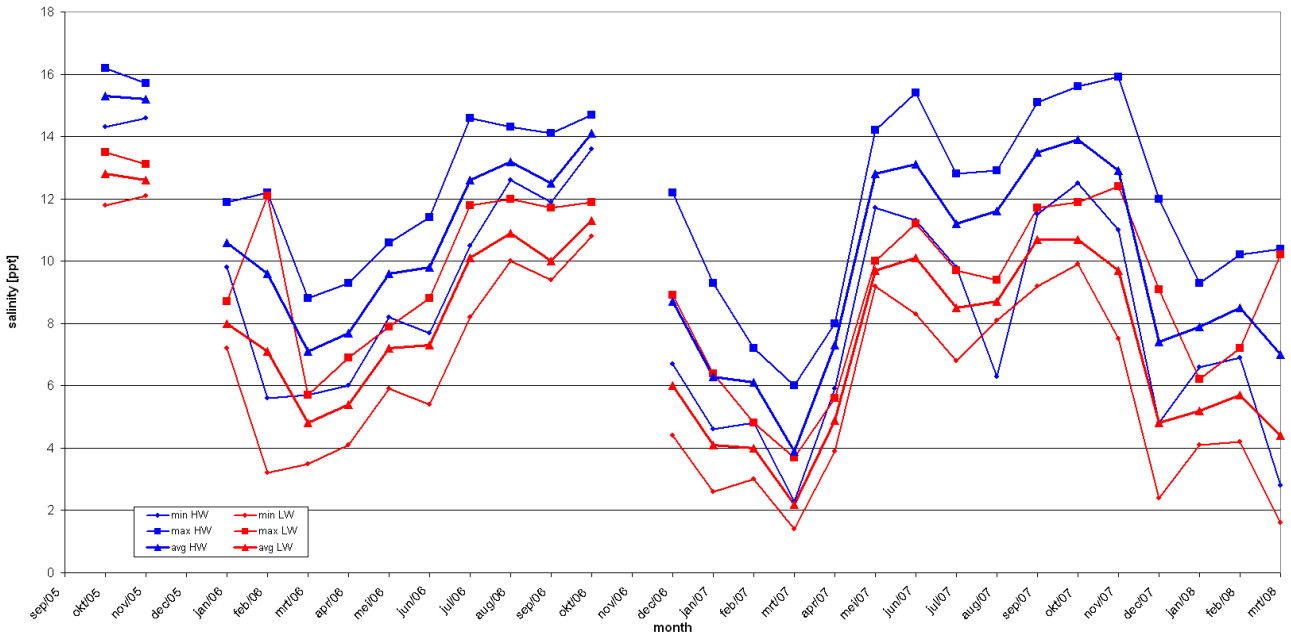
Buoy 84
3.3 m above bottom (-6.0 m TAW)

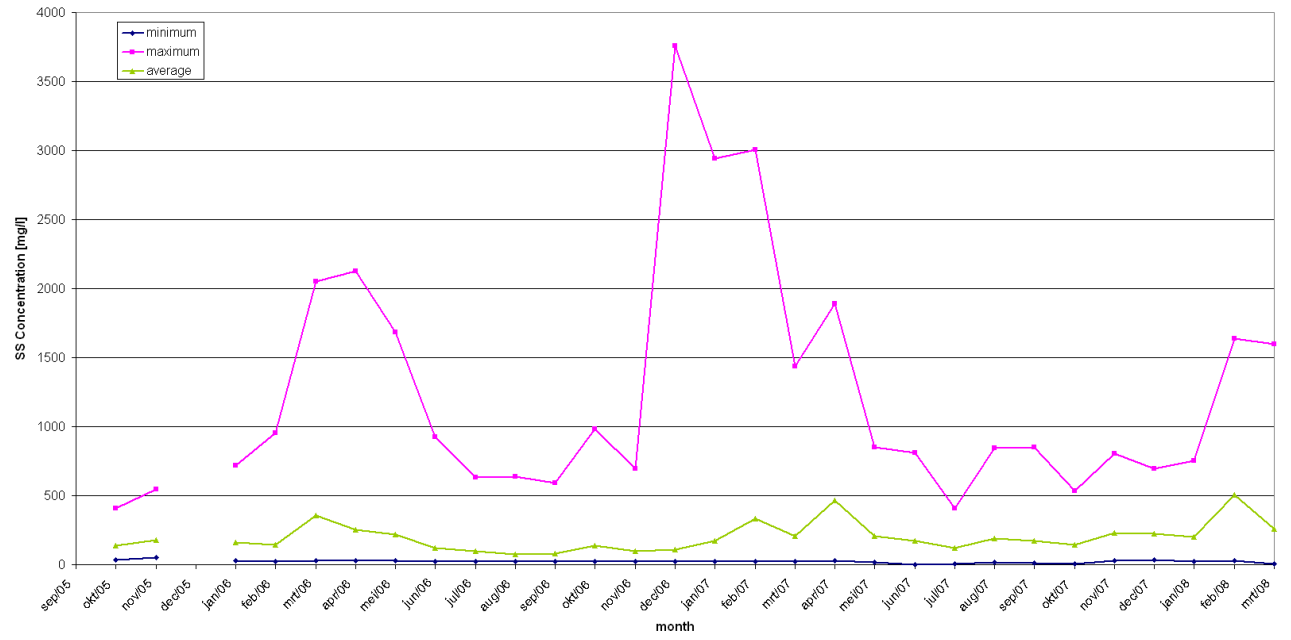
Data processed by:

In association with:

I/RA/11283/07.100/MSA

Salinity & SS Concentration





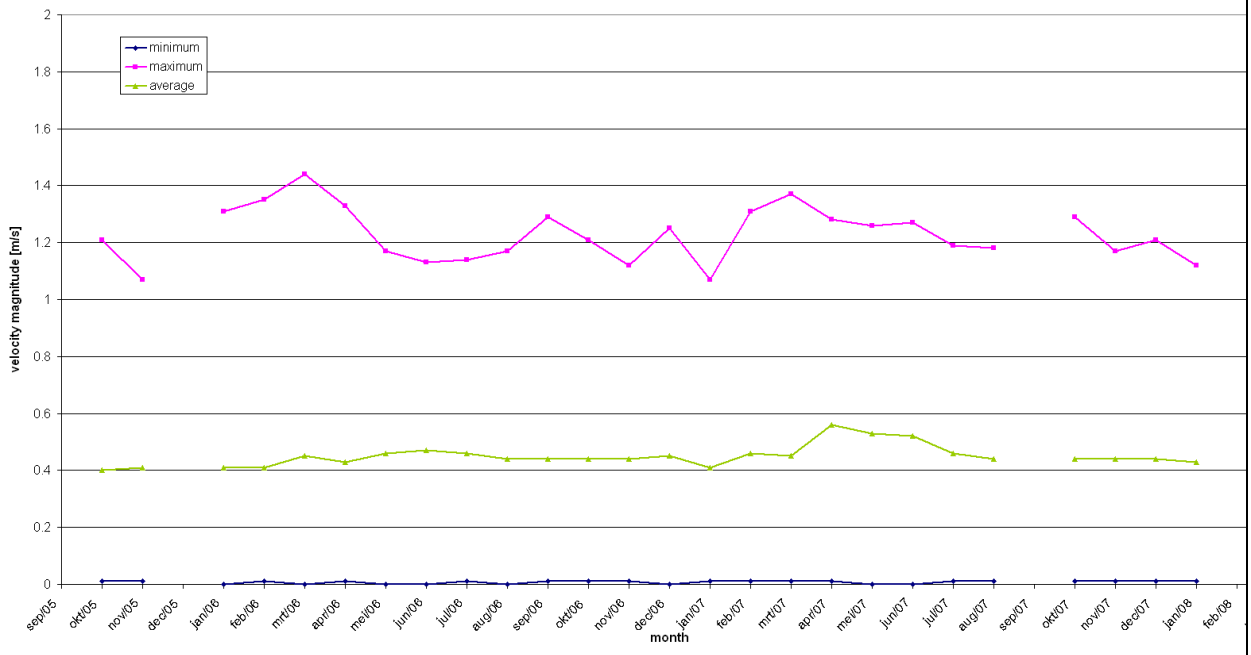
Buoy 84
3.3m above bottom (-6.0m TAW)

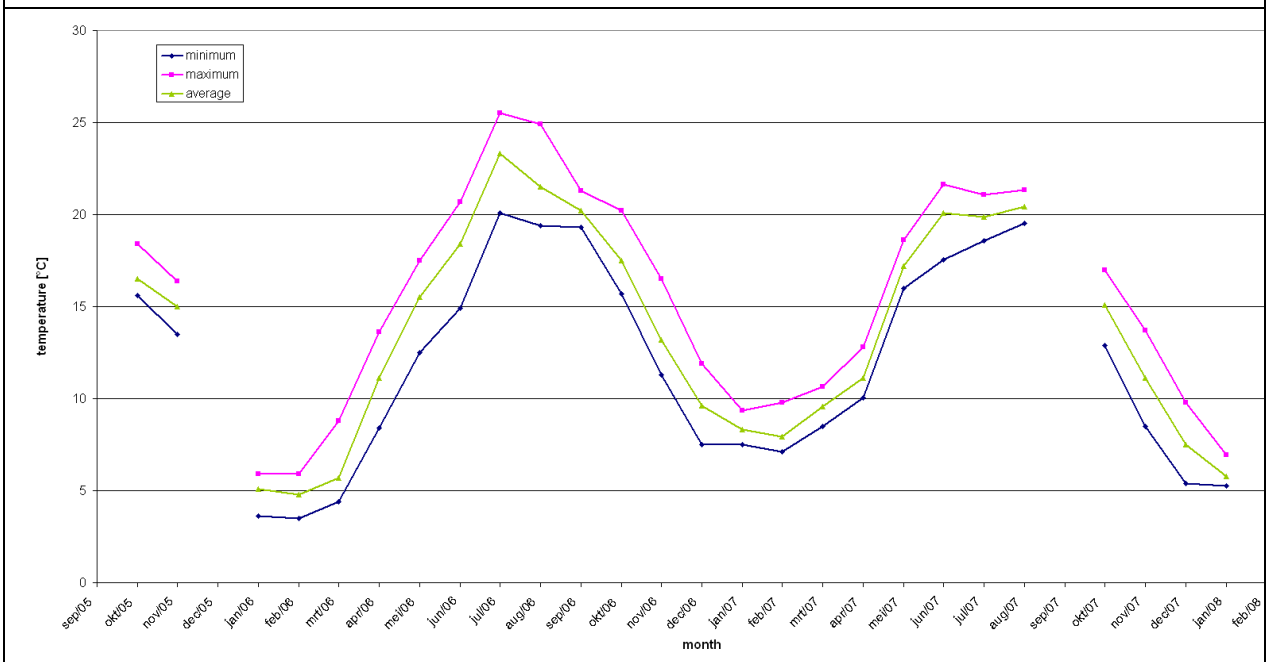
Data processed by:

In association with:

I/RA/11283/07.100/MSA

Velocity magnitude & temperature





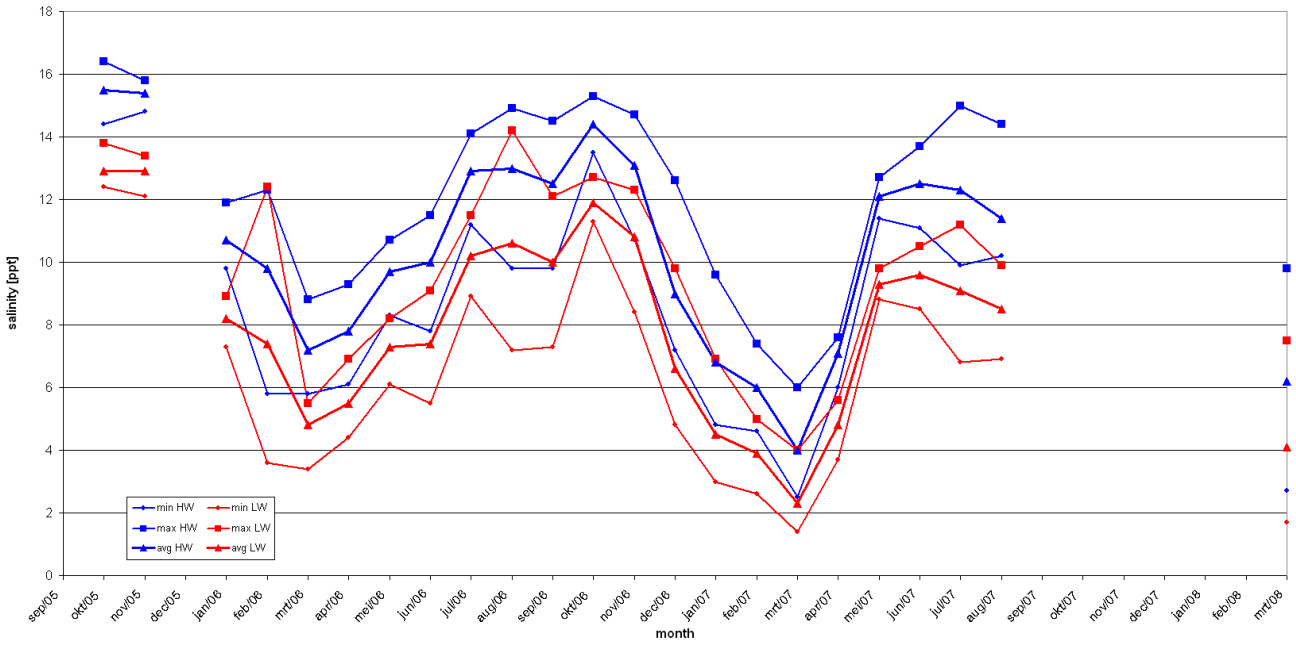
Buoy 84
0.8m above bottom (-8.0m TAW)

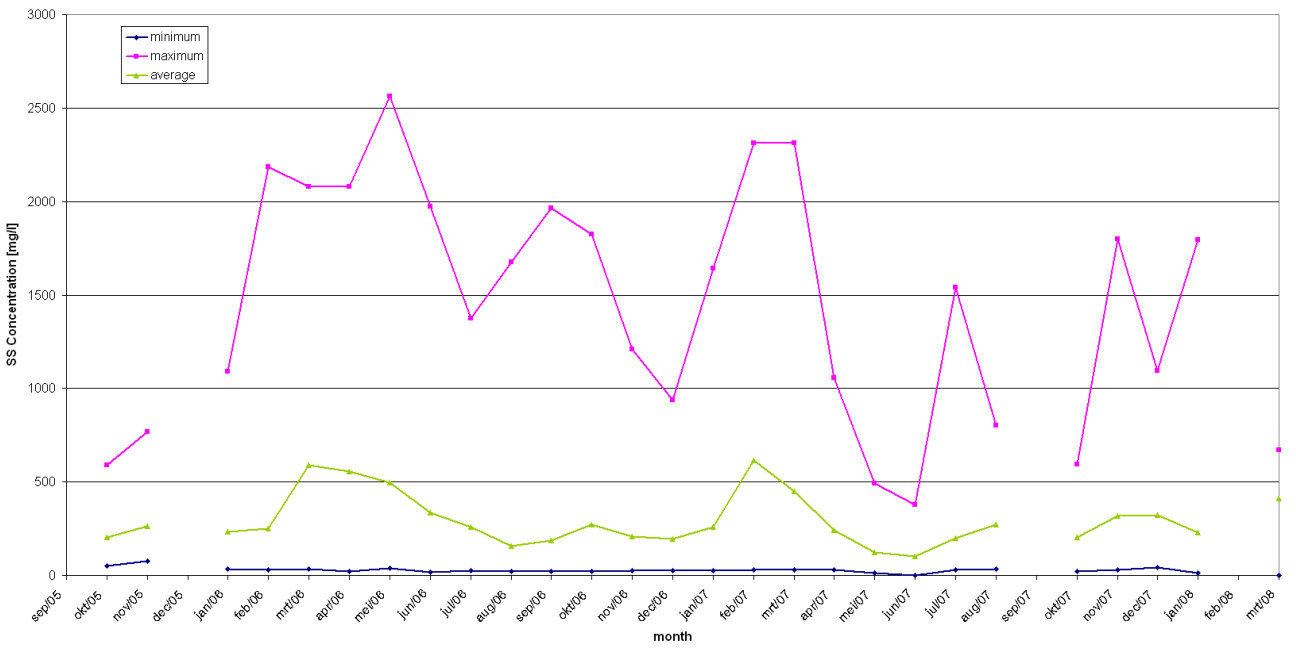
Data processed by: IMDC

In association with: WL | delft hydraulics, GEMS International

I/RA/11283/07.100/MSA

Salinity & SS Concentration





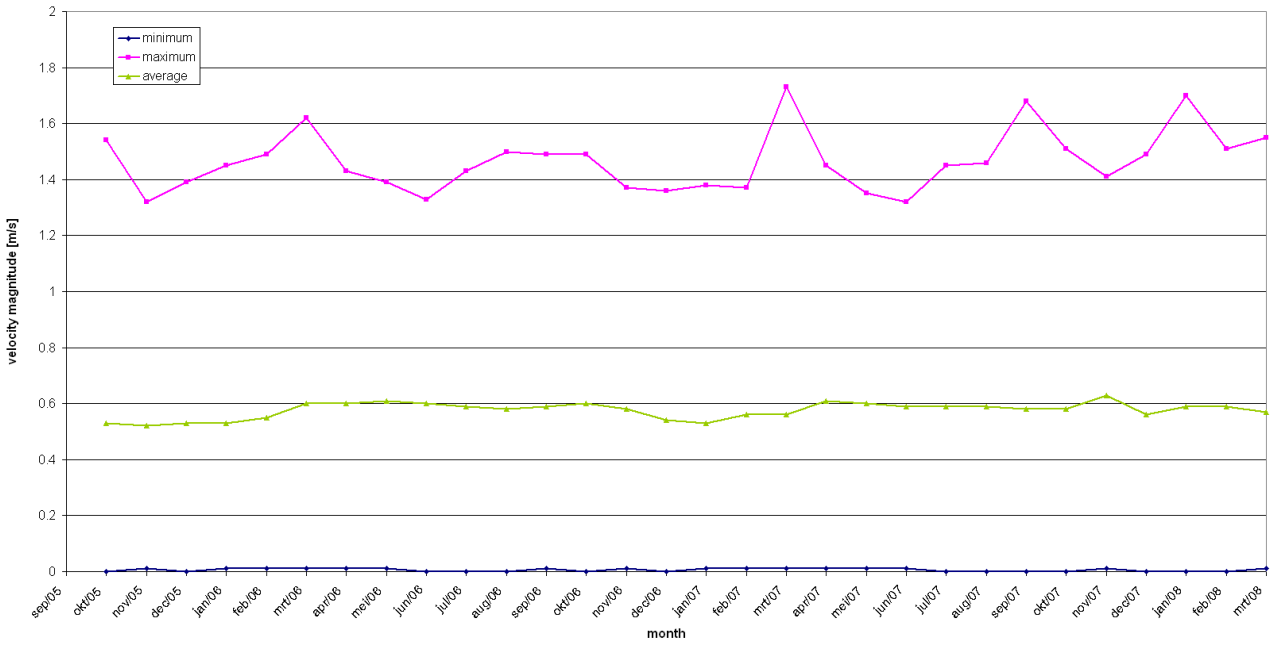
Buoy 84
0.8m above bottom (-8.0m TAW)

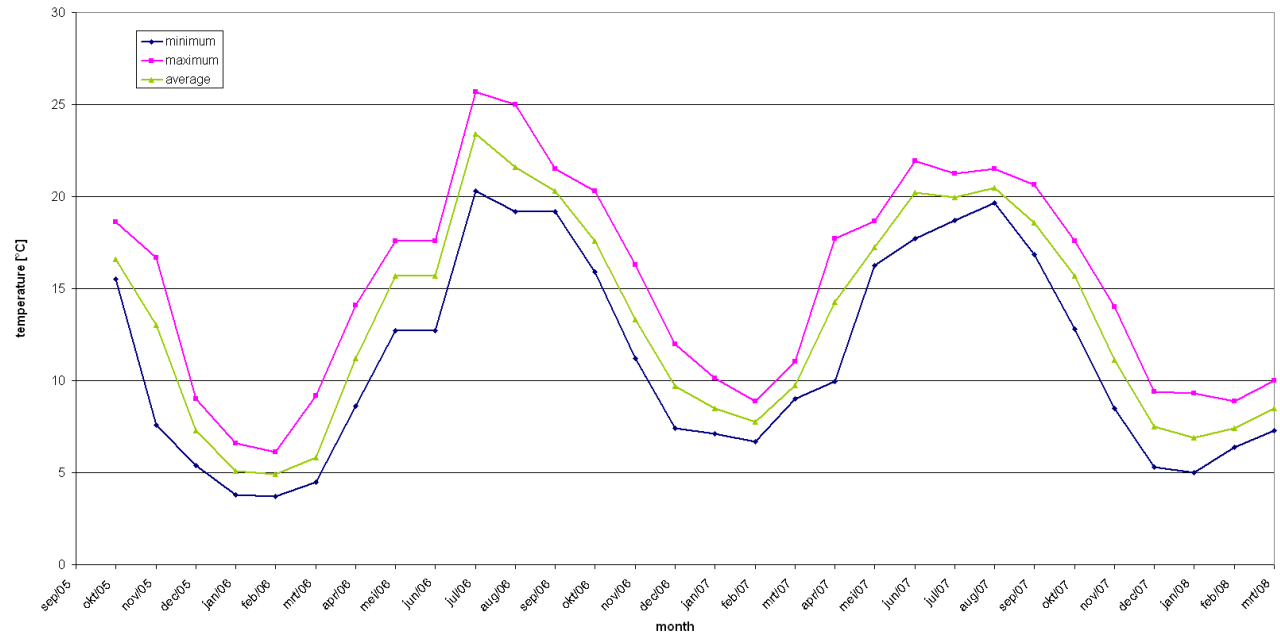
Data processed by: IMDC

In association with: WL | delft hydraulics, GEMS International

I/RA/11283/07.100/MSA

Velocity magnitude & temperature





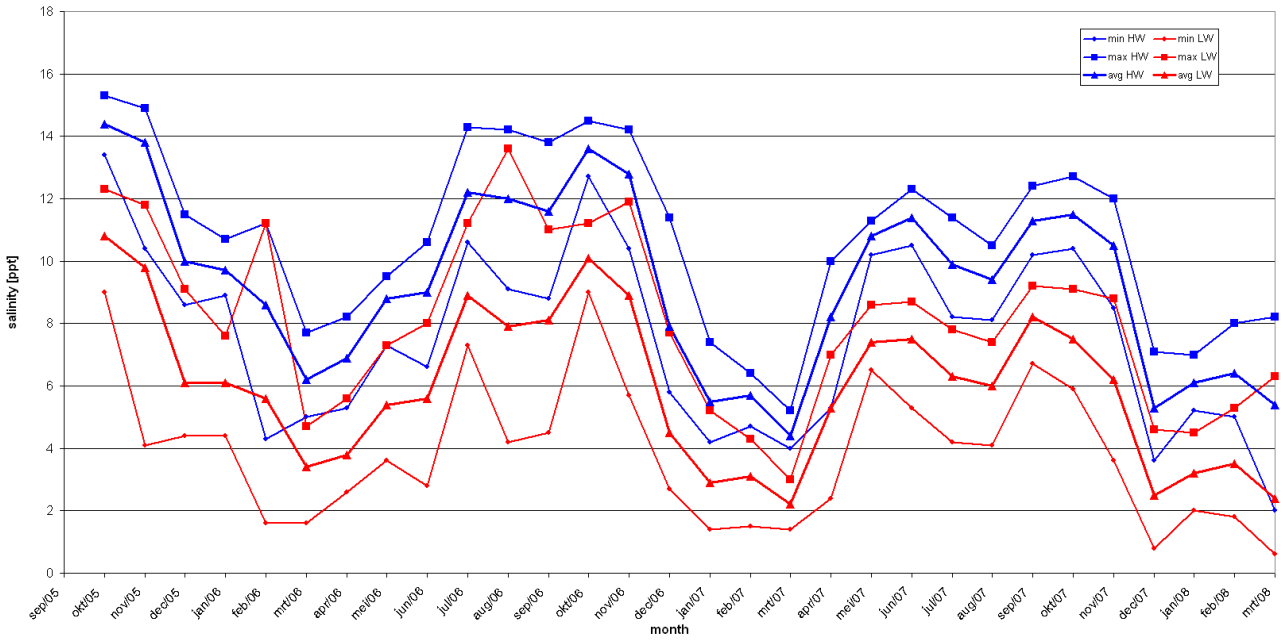
Buoy 97
3.3m above bottom (-4.8m TAW)

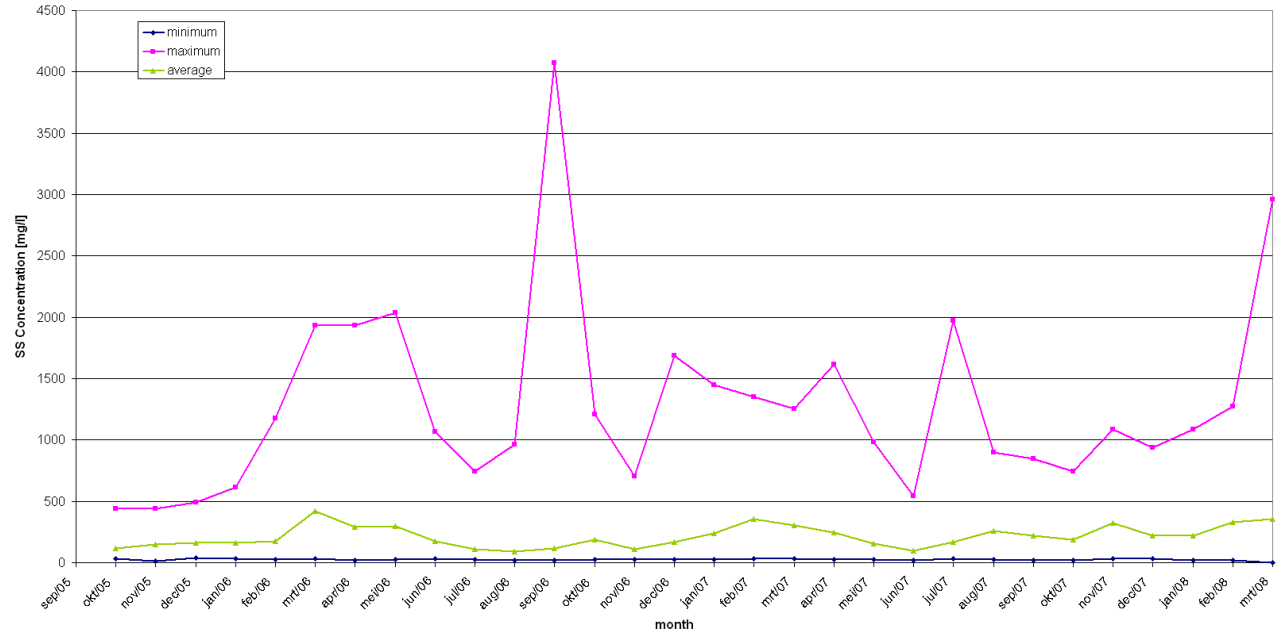
Data processed by: IMDC

In association with: WL | delft hydraulics, GEMS International

I/RA/11283/07.100/MSA

Salinity & SS Concentration



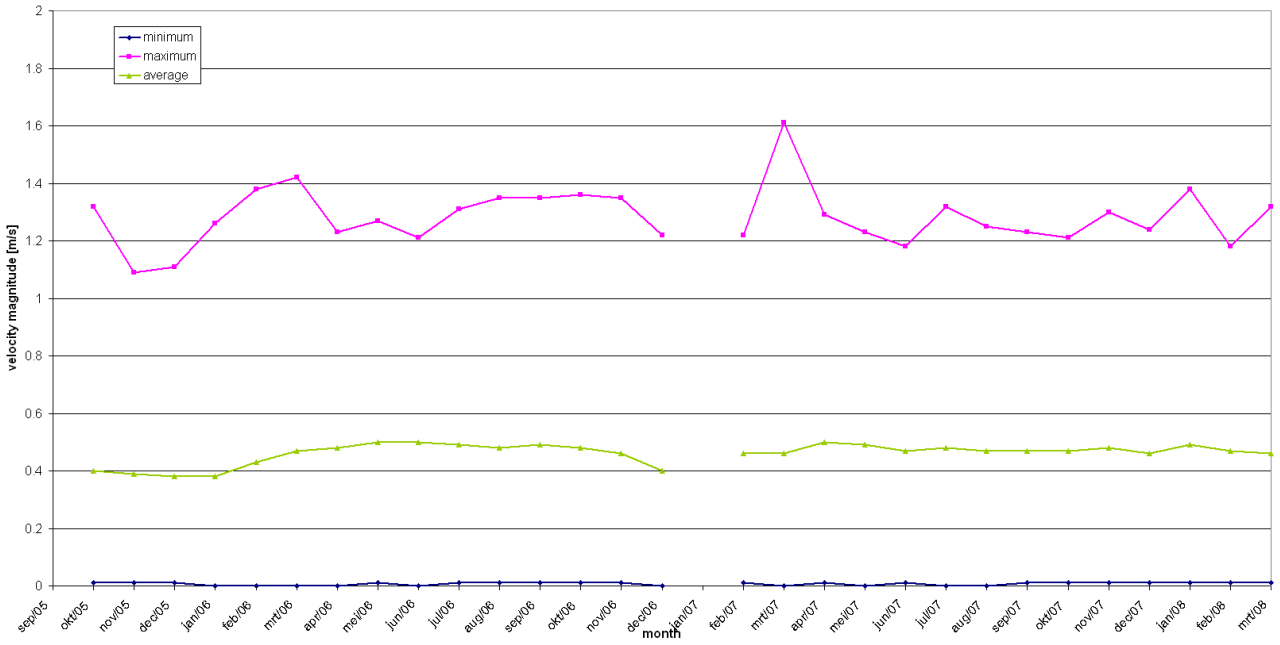


Buoy 97
3.3m above bottom (-4.8m TAW)

Data processed by:

In association with:

Velocity magnitude & temperature



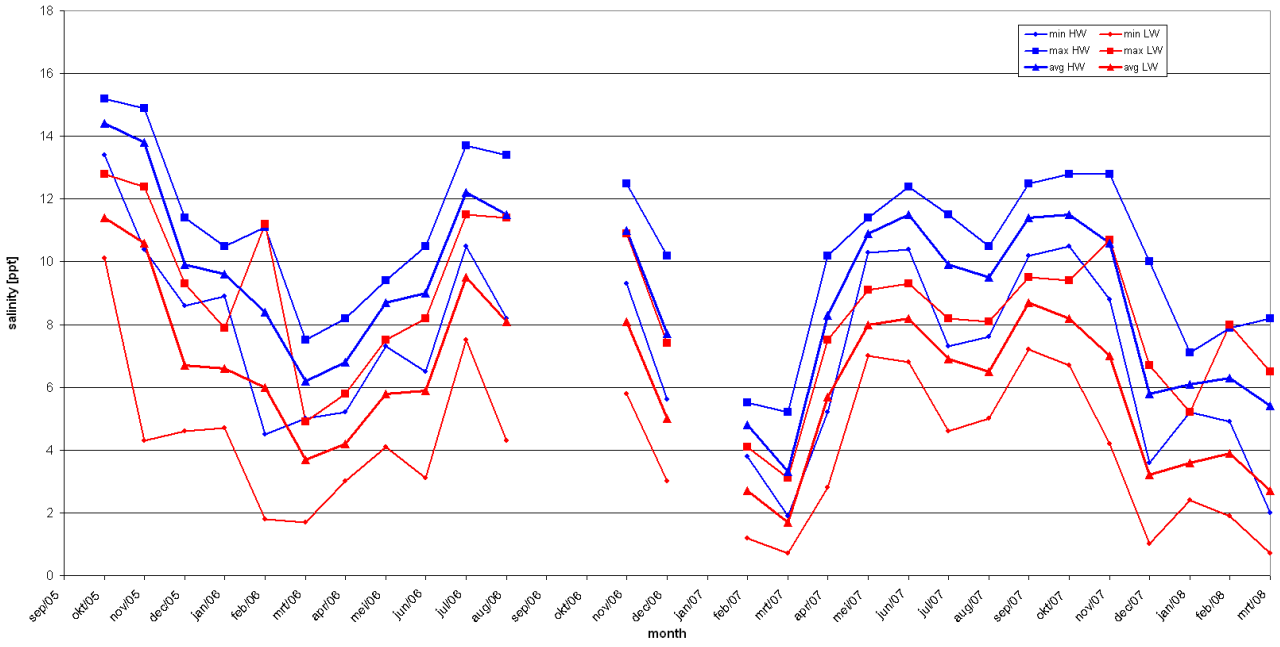
Buoy 97
0.8m above bottom (-7.2m TAW)

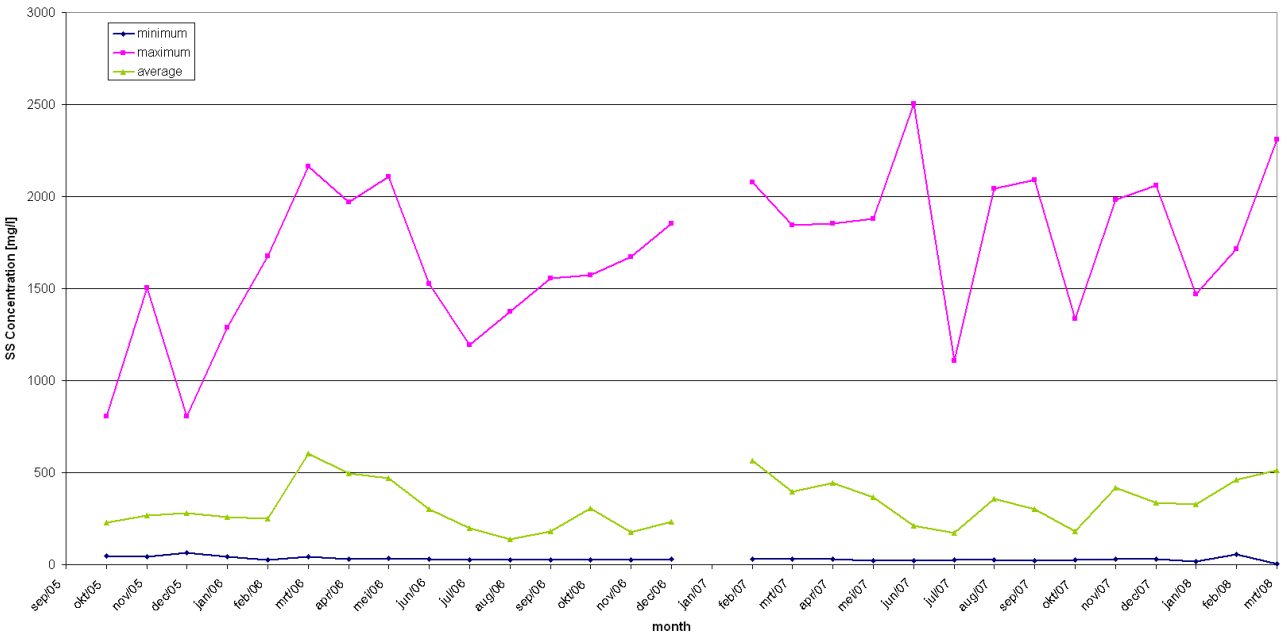
Data processed by:

In association with:

I/RA/11283/07.100/MSA

Salinity & SS Concentration





Buoy 97
0.8m above bottom (-7.2m TAW)

Data processed by:

In association with:

I/RA/11283/07.100/MSA

B.4 Total result from January 2008 till March 2008 of velocity magnitude, temperature, salinity and suspended sediment concentration

Averages for the whole deployment period of each instrument [January 2008 – March 2008]

Location	*Depth [m TAW]*	*Velocity [m/s]*			*Temperature [°C]*			*SS concentration [mg/l]*		
		Min	*Max*	*Avg*	*Min*	*Max*	*Avg*	*Min*	*Max*	*Avg*
Buoy 84	-6.0	0	1.45	0.48	5.2	9.6	7.6	7	1639	309
Buoy 84	-8.0	0*	1.27*	0.34*	5.2*	9.5*	7.9*	2*	1797*	367*
Buoy 97	-4.8	0	1.7	0.58	5.0	10.0	7.6	3	2964	301
Buoy 97	-7.2	0.01	1.38	0.47	5.0	10.0	7.6	5	2310	434

Salinity [ppt]

Location	*Depth [m TAW]*	*Minimum*		*Maximum*		*Average*	
		Slack HW	*Slack LW*	*Slack HW*	*Slack LW*	*Slack HW*	*Slack LW*
Buoy 84	-6.0	2.8	1.6	10.4	10.2	7.7	5
Buoy 84	-8.0	2.7*	1.7*	9.8*	7.1*	6.6*	4.4*
Buoy 97	-4.8	2	0.6	8.2	6.3	5.9	3
Buoy 97	-7.2	2	0.7	8.2	8	5.9	3.4

-: No data or less than 30% of the monthly data available.
*: Less than 70% of the monthly data available.

APPENDIX C.

LONG-TERM MEASUREMENTS AT OOSTERWEEL AND PROSPERPOLDER

(WL – CEL HYDROMETRIE)

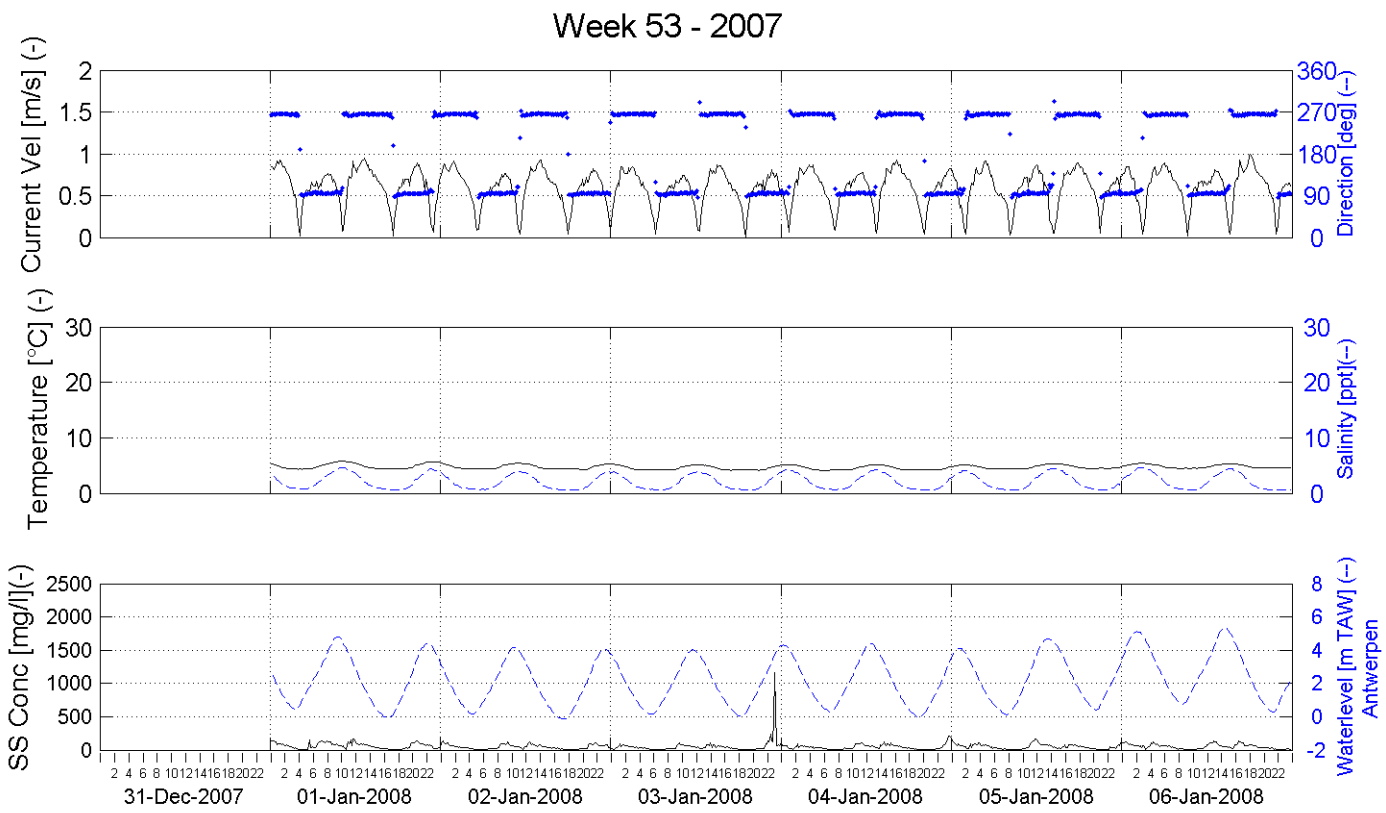
C.1 Datasheets week series

Datasheet order

Nr	*Location*	*Depth of Instrument*		*Sensor*	*Period*
		[m] above bottom	*[m TAW]*		
1	Oosterweel left bank	4.5	-1.8	Aanderaa 0152	01/01/2008 – 31/03/2008
2	Oosterweel left bank	1.0	-5.5	Aanderaa 0149	01/01/2008 – 31/03/2008
3	Prosperpolder	2.5	-1.5	Aanderaa 0117	01/01/2008 – 31/03/2008

C.1.1. Oosterweel left bank top

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Oosterweel (left bank) - 4.5m above bottom (-1.8m TAW)

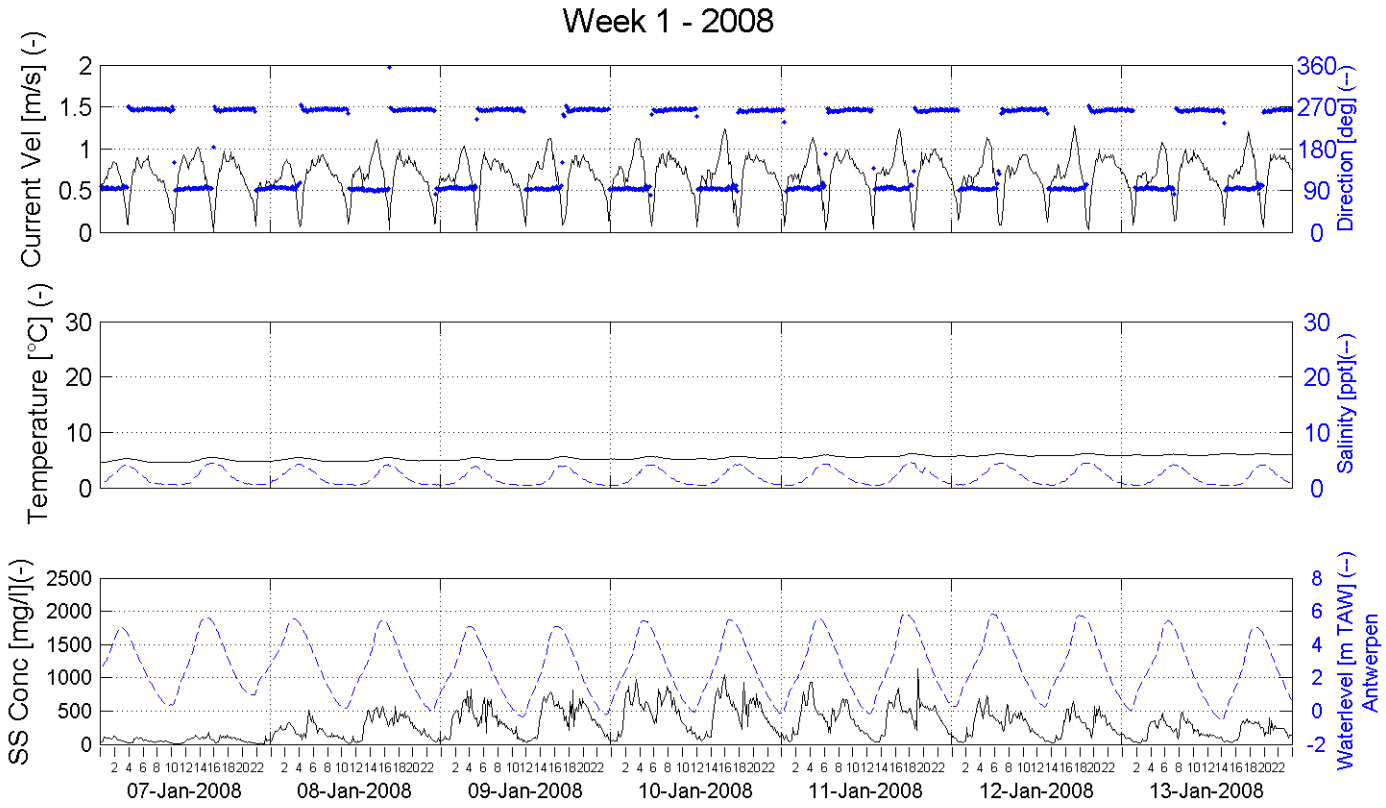
Processed by:

IMDC

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Oosterweel (left bank) - 4.5m above bottom (-1.8m TAW)

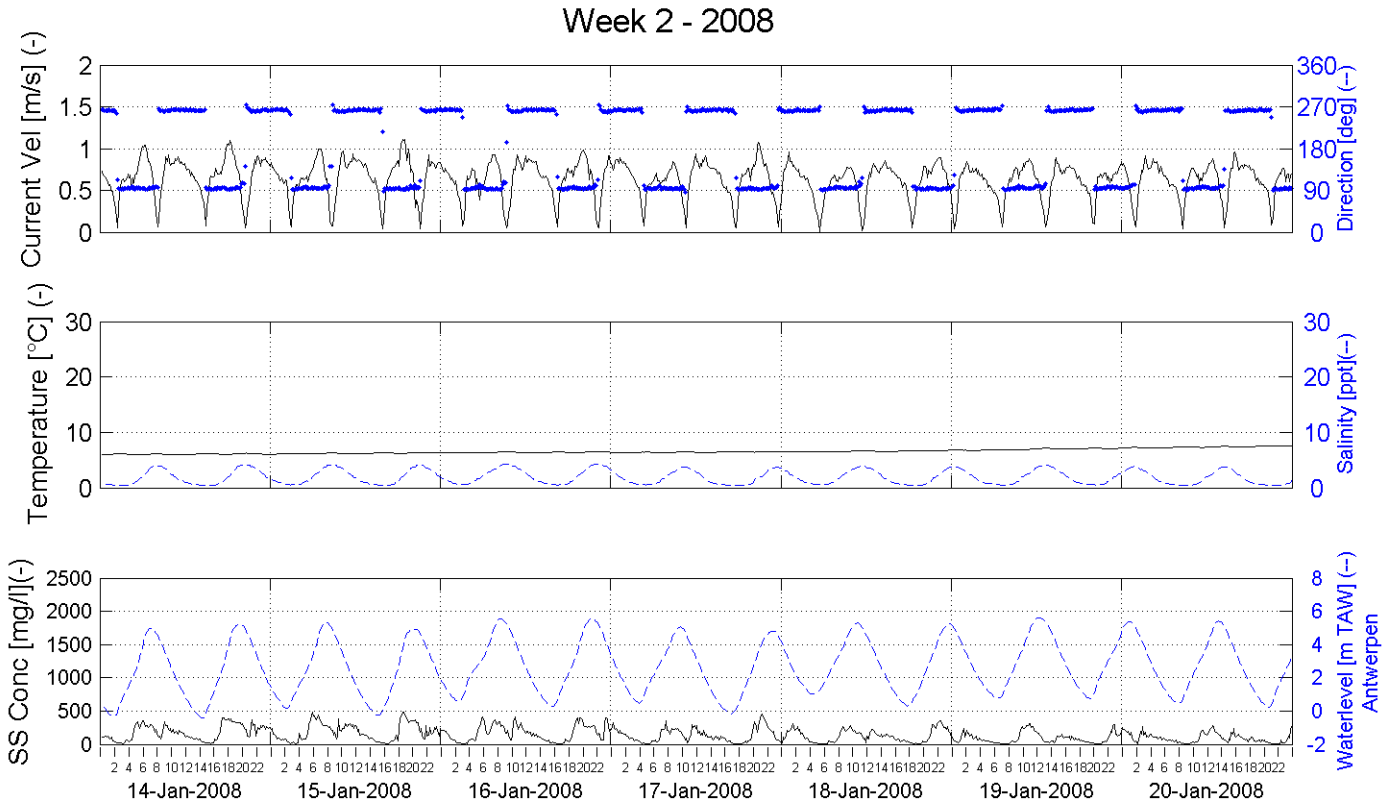
Processed by:

IMDC

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Oosterweel (left bank) - 4.5m above bottom (-1.8m TAW)

Processed by:

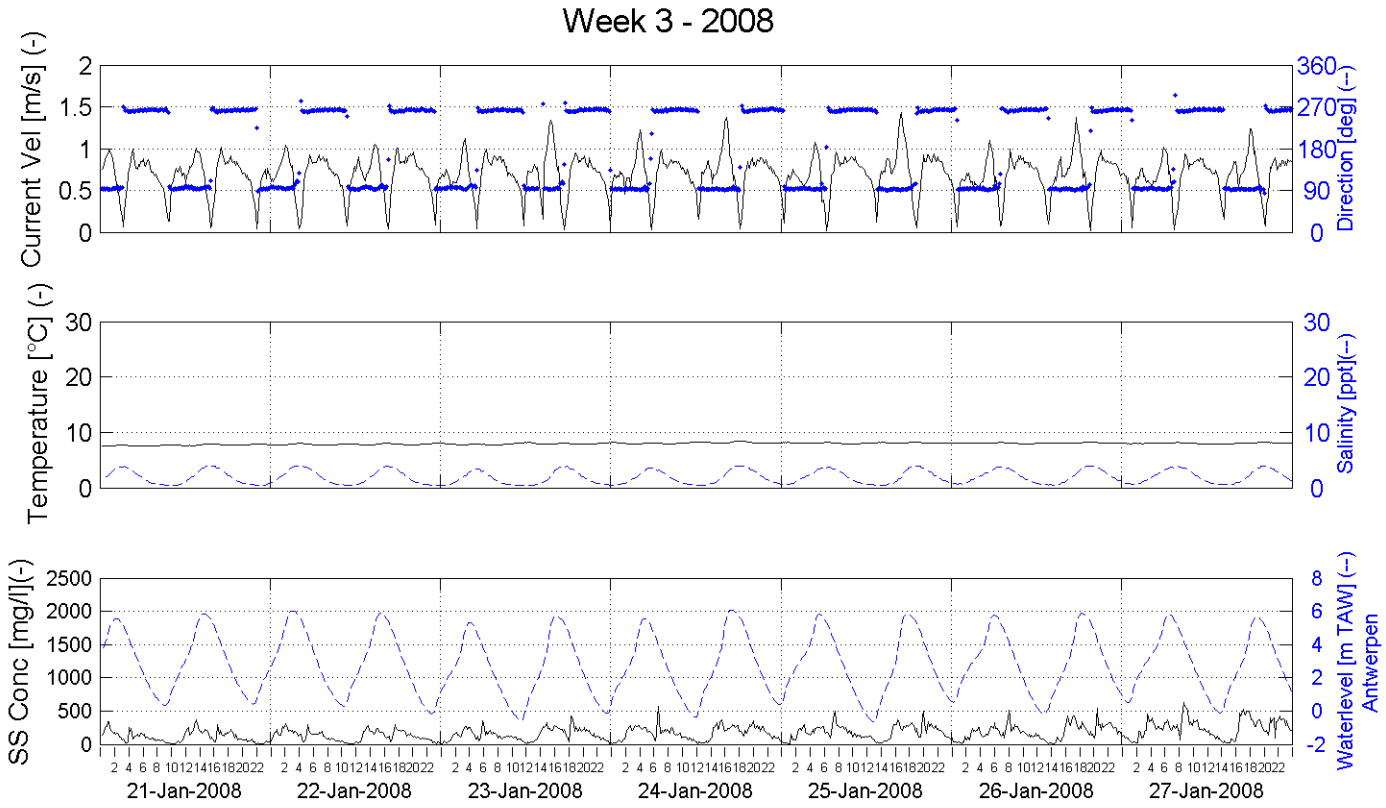
IMDC

In Association with:

GEMS

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Oosterweel (left bank) - 4.5m above bottom (-1.8m TAW)

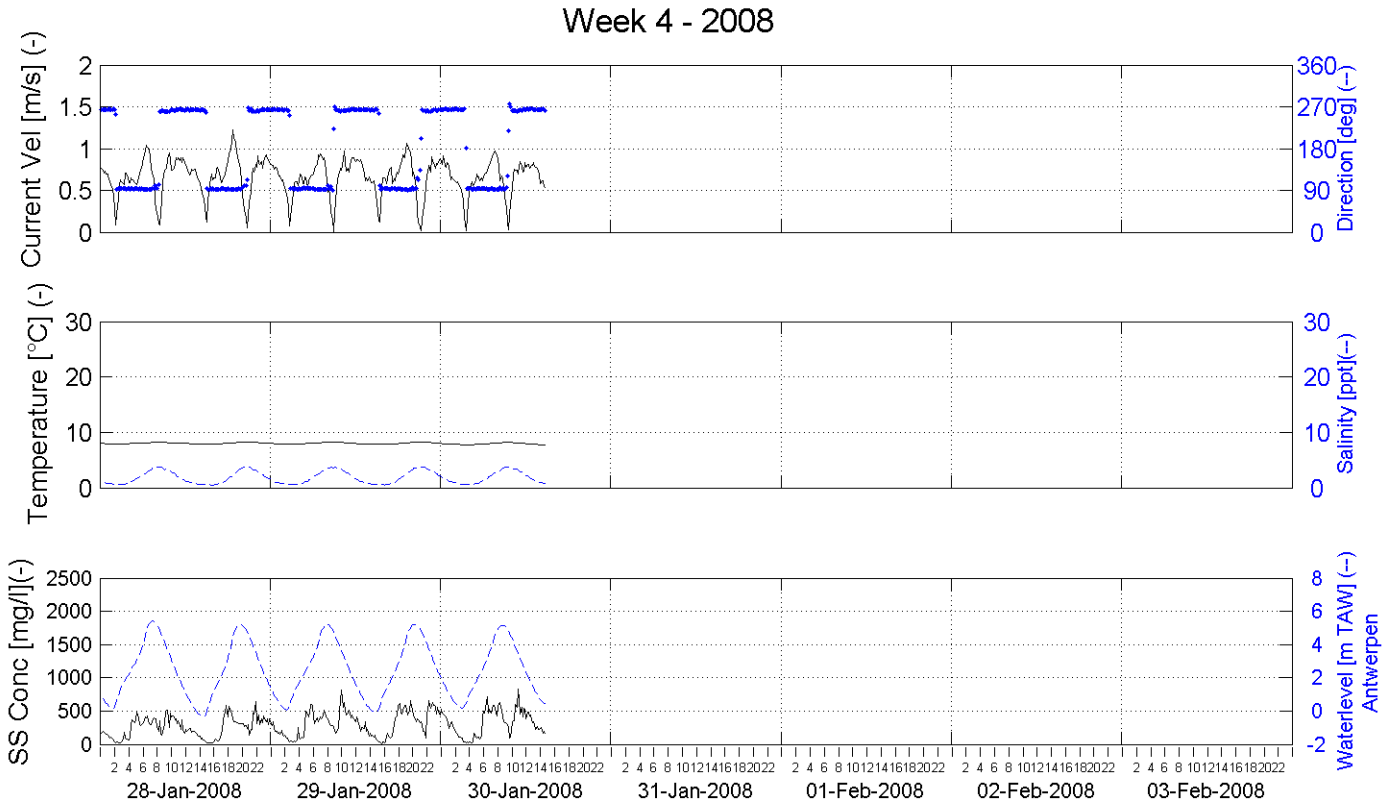
Processed by:

IMDC

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Oosterweel (left bank) - 4.5m above bottom (-1.8m TAW)

Processed by:

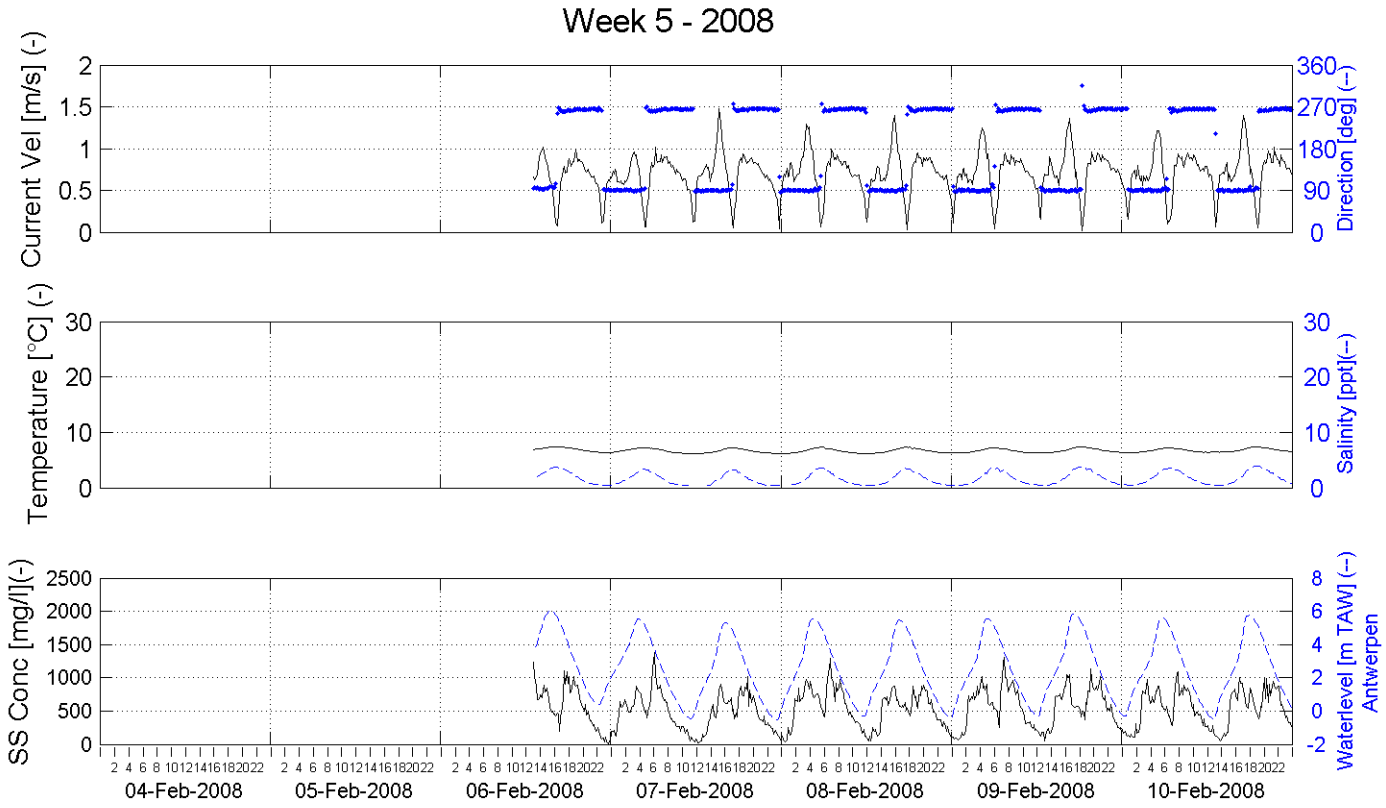
IMDC

In Association with:

GEMS

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Oosterweel (left bank) - 4.5m above bottom (-1.8m TAW)

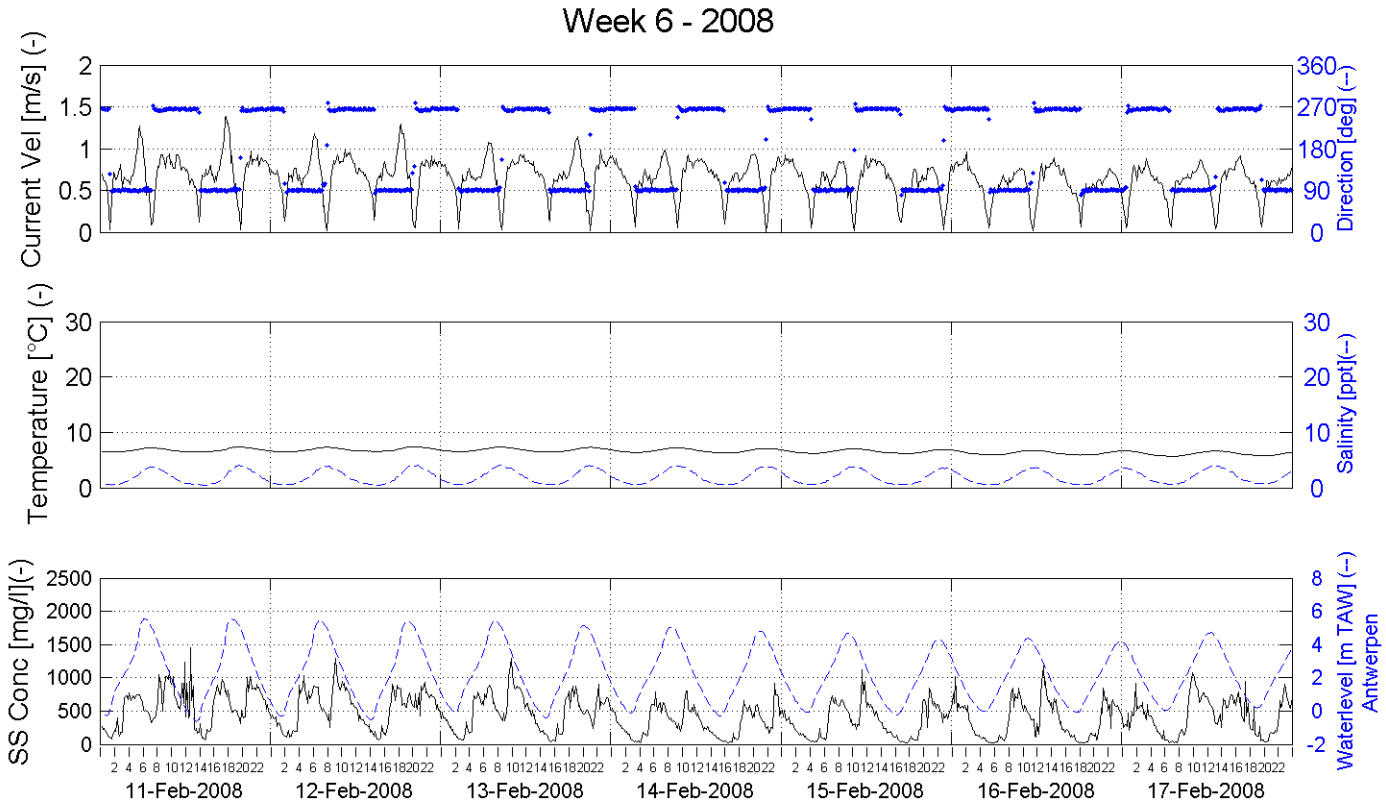
Processed by:

IMDC

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Oosterweel (left bank) - 4.5m above bottom (-1.8m TAW)

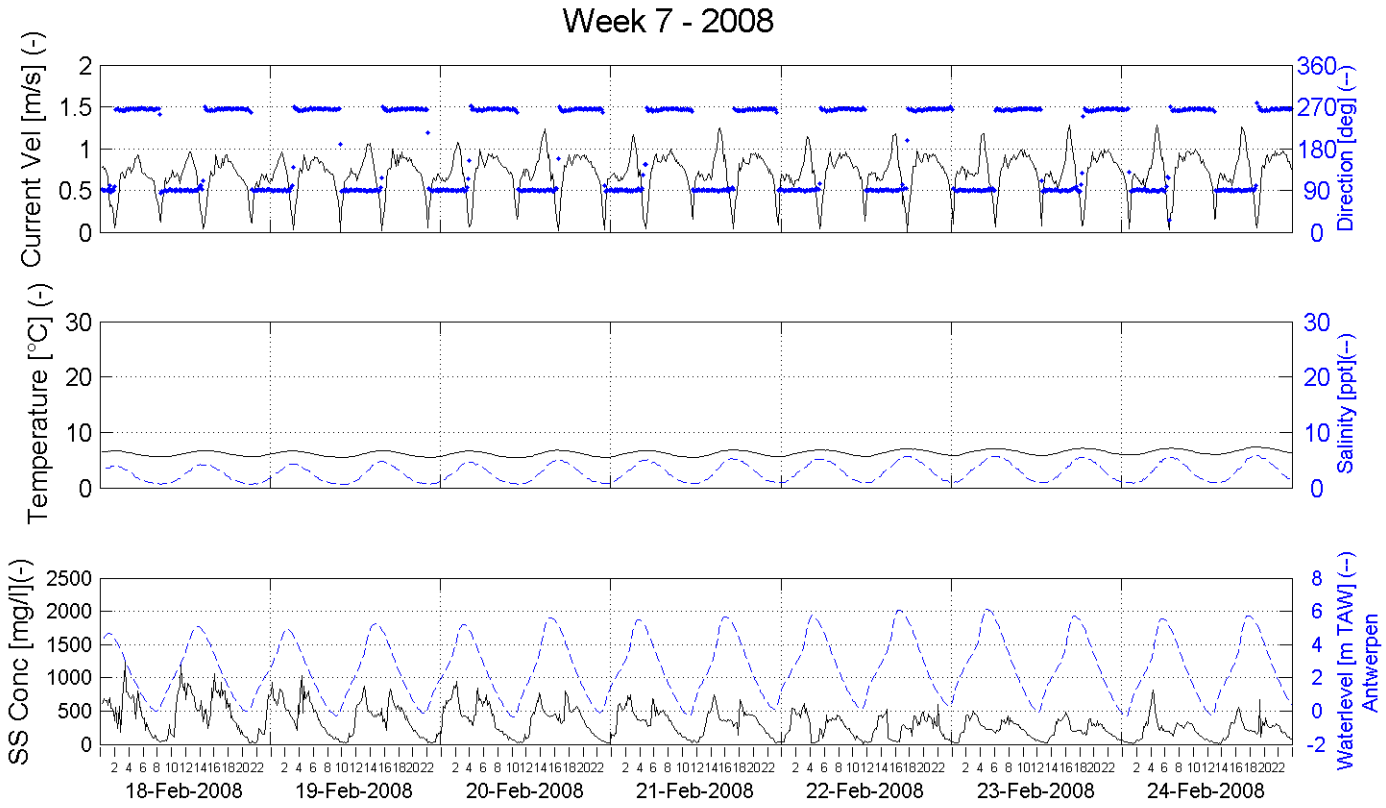
Processed by:

IMDC

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Oosterweel (left bank) - 4.5m above bottom (-1.8m TAW)

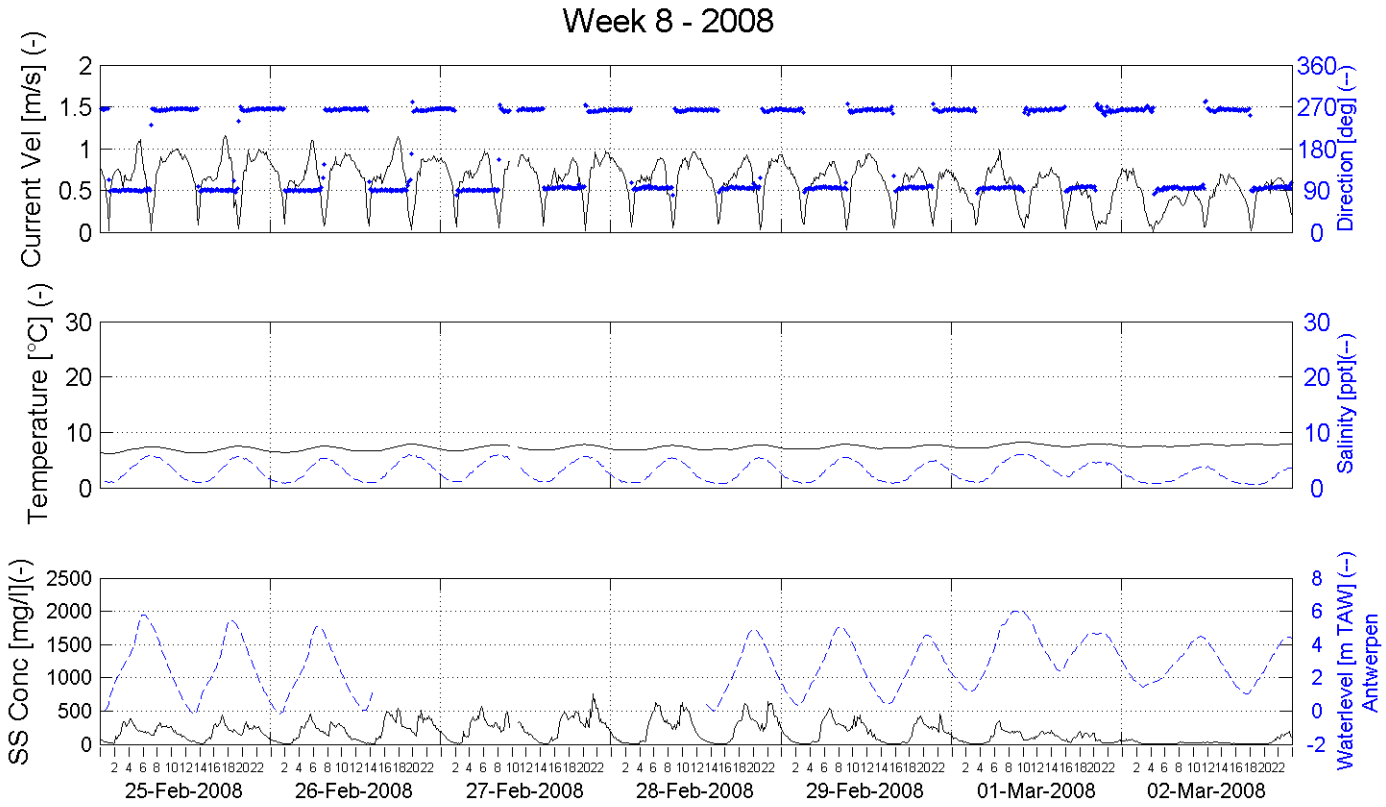
Processed by:

IMDC

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Oosterweel (left bank) - 4.5m above bottom (-1.8m TAW)

Processed by:

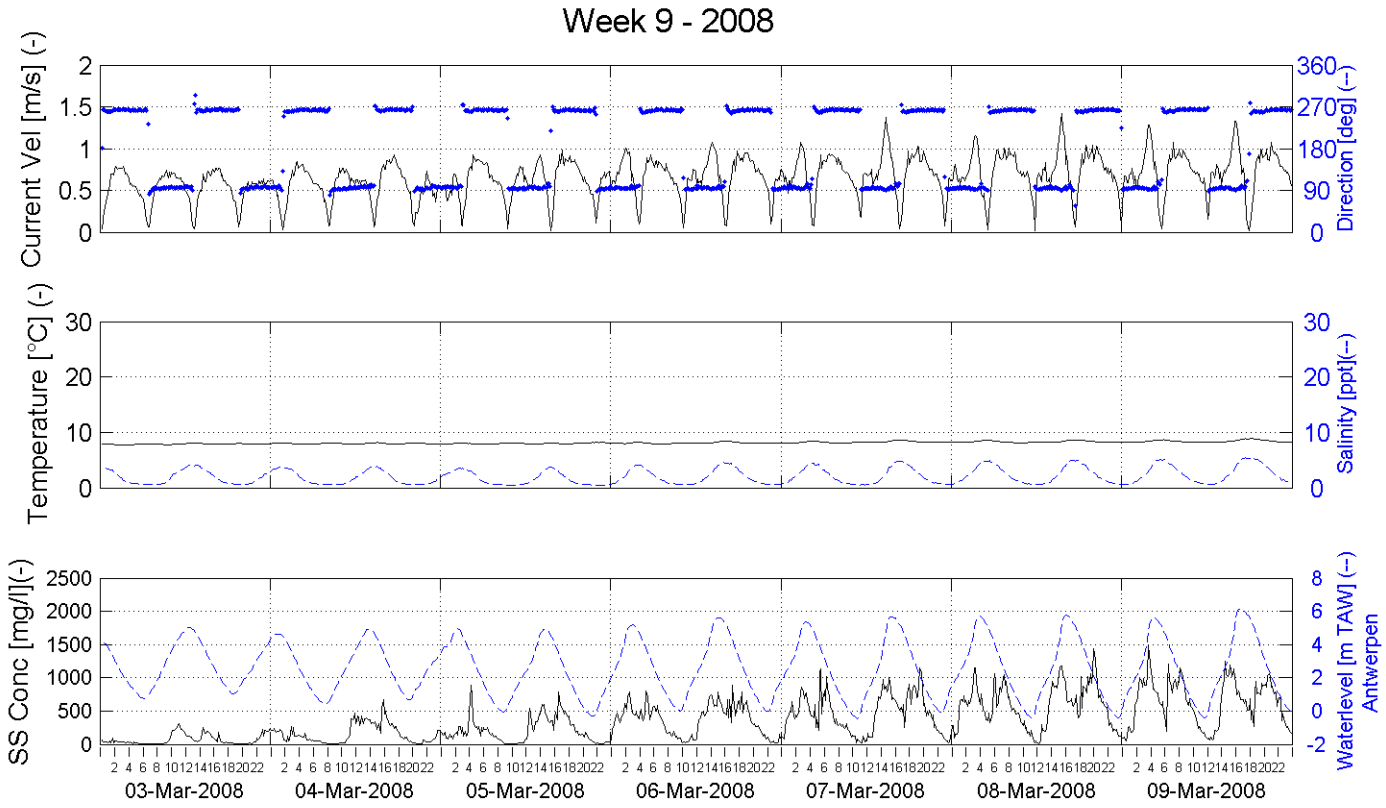
IMDC

In Association with:

GEMS

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Oosterweel (left bank) - 4.5m above bottom (-1.8m TAW)

Processed by:

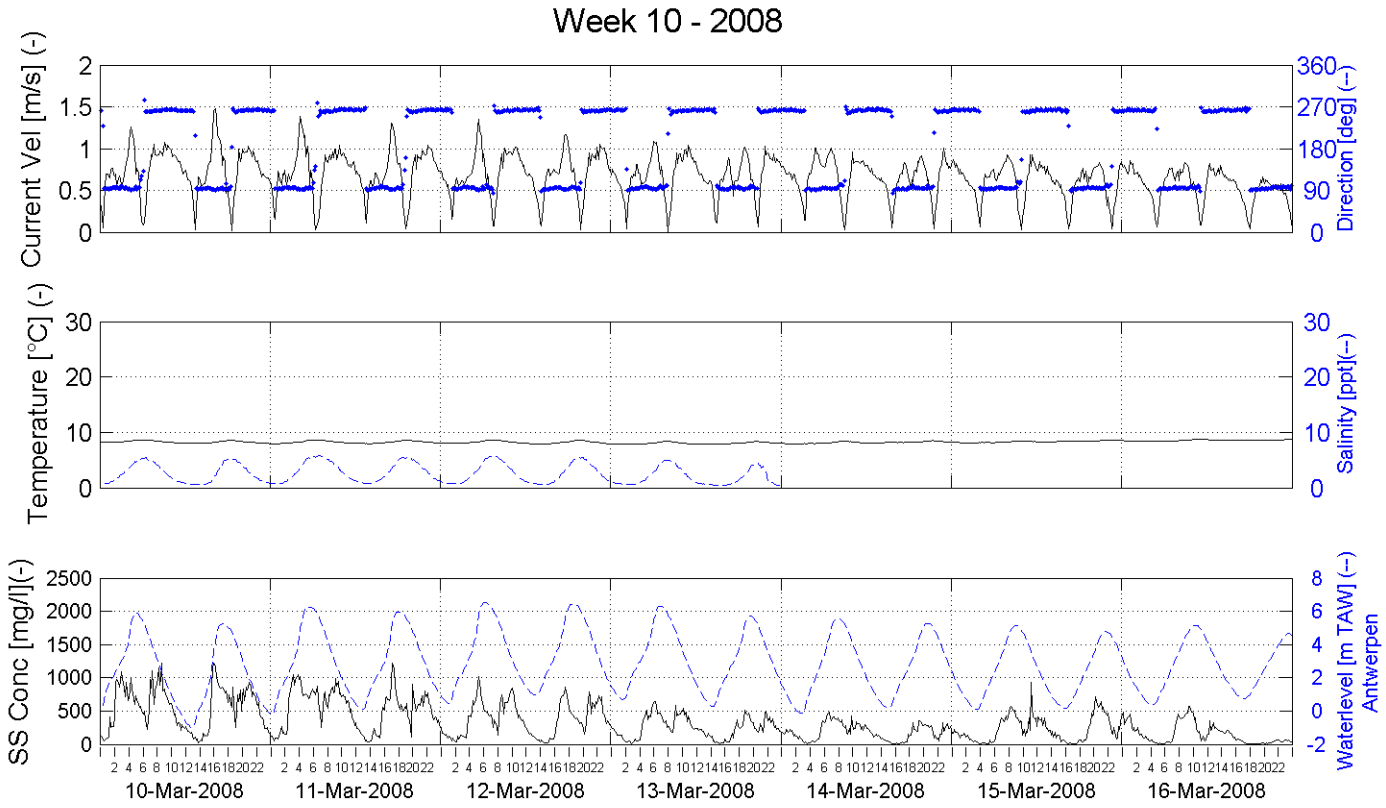
IMDC

In Association with:

GEMS

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Oosterweel (left bank) - 4.5m above bottom (-1.8m TAW)

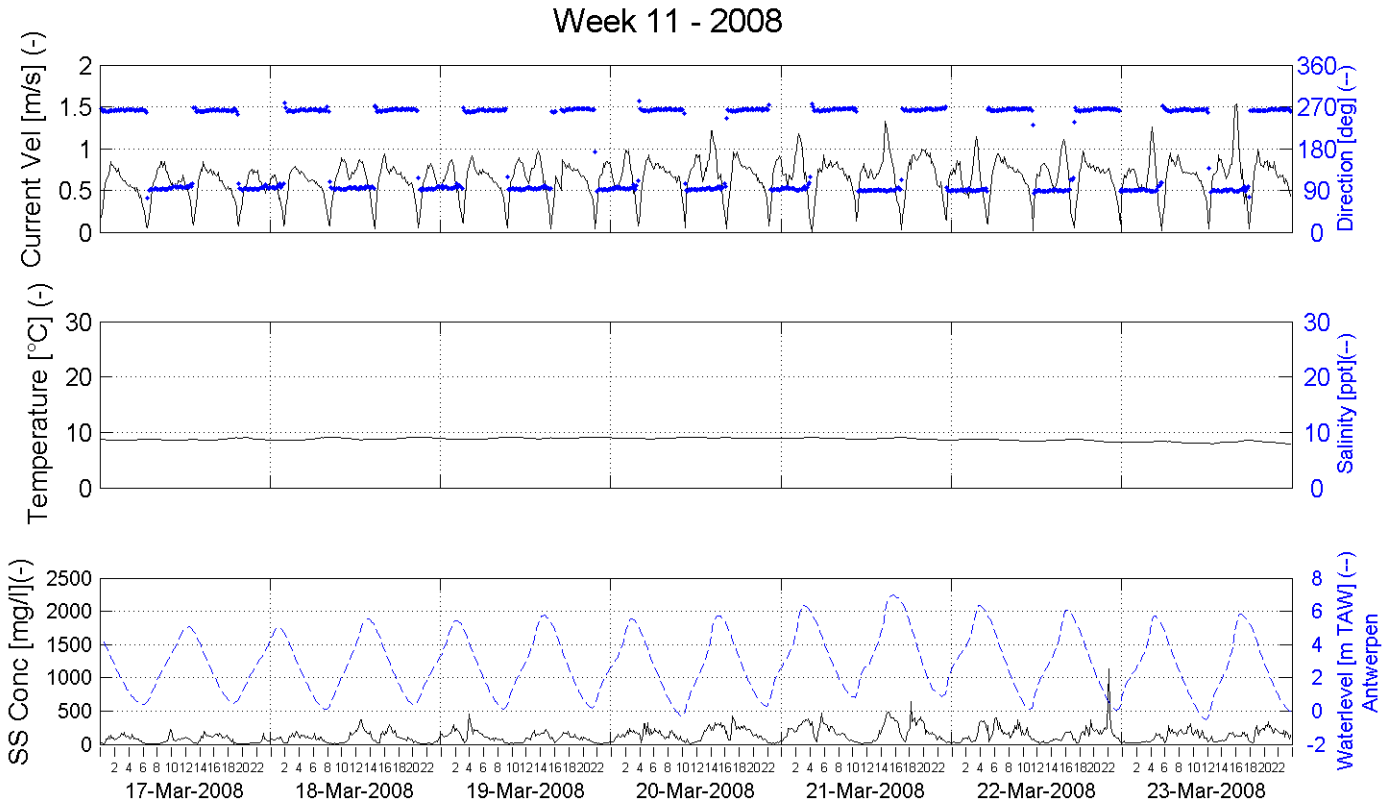
Processed by:

IMDC

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Oosterweel (left bank) - 4.5m above bottom (-1.8m TAW)

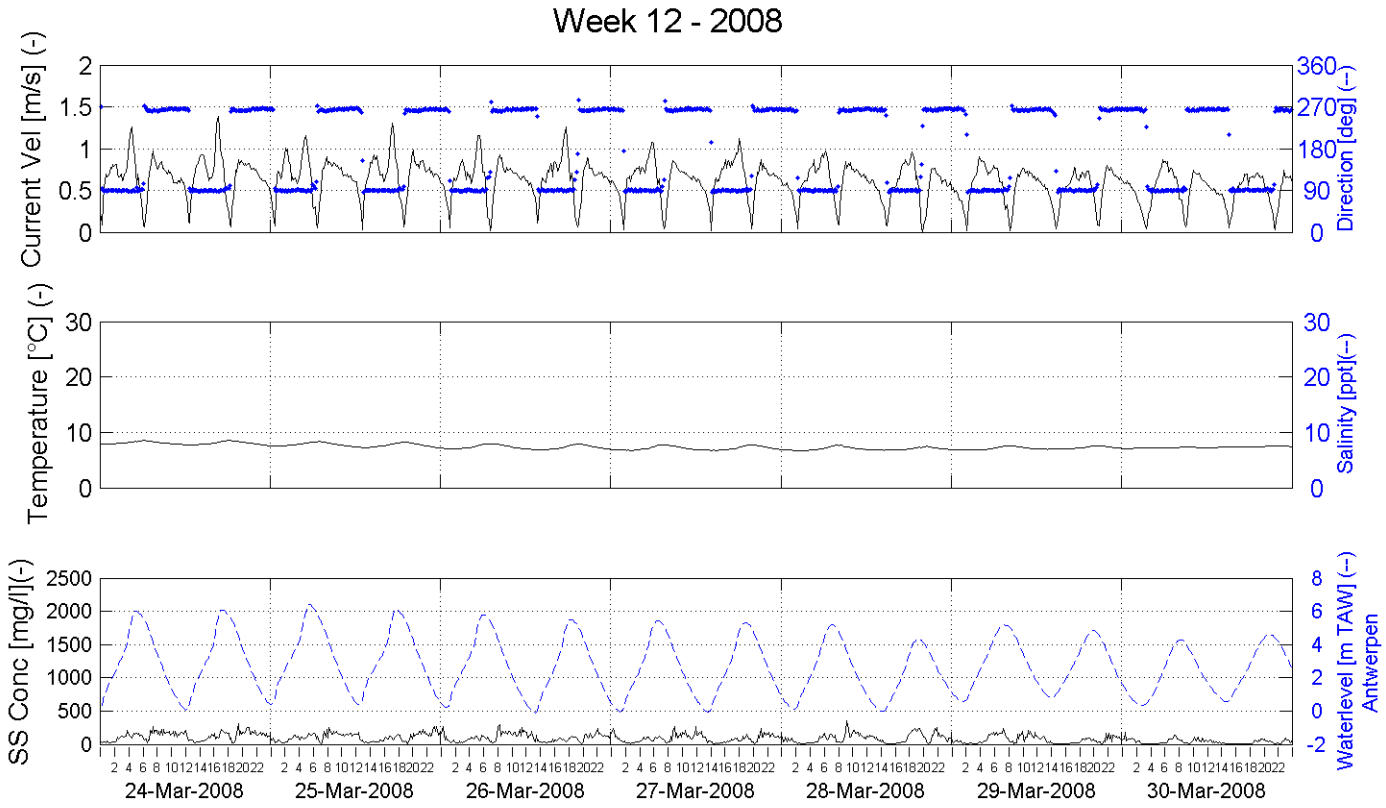
Processed by:

IMDC

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Oosterweel (left bank) - 4.5m above bottom (-1.8m TAW)

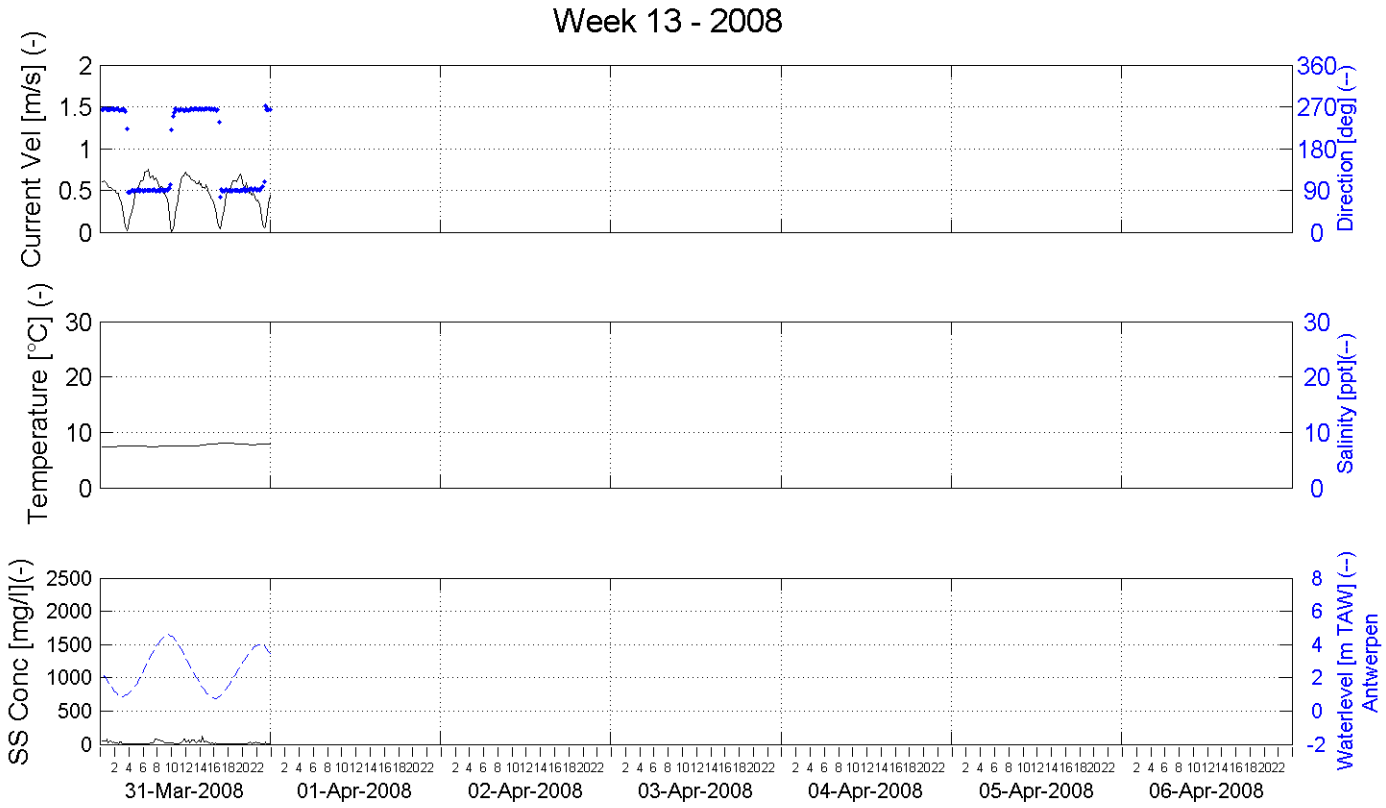
Processed by:

IMDC

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Oosterweel (left bank) - 4.5m above bottom (-1.8m TAW)

Processed by:

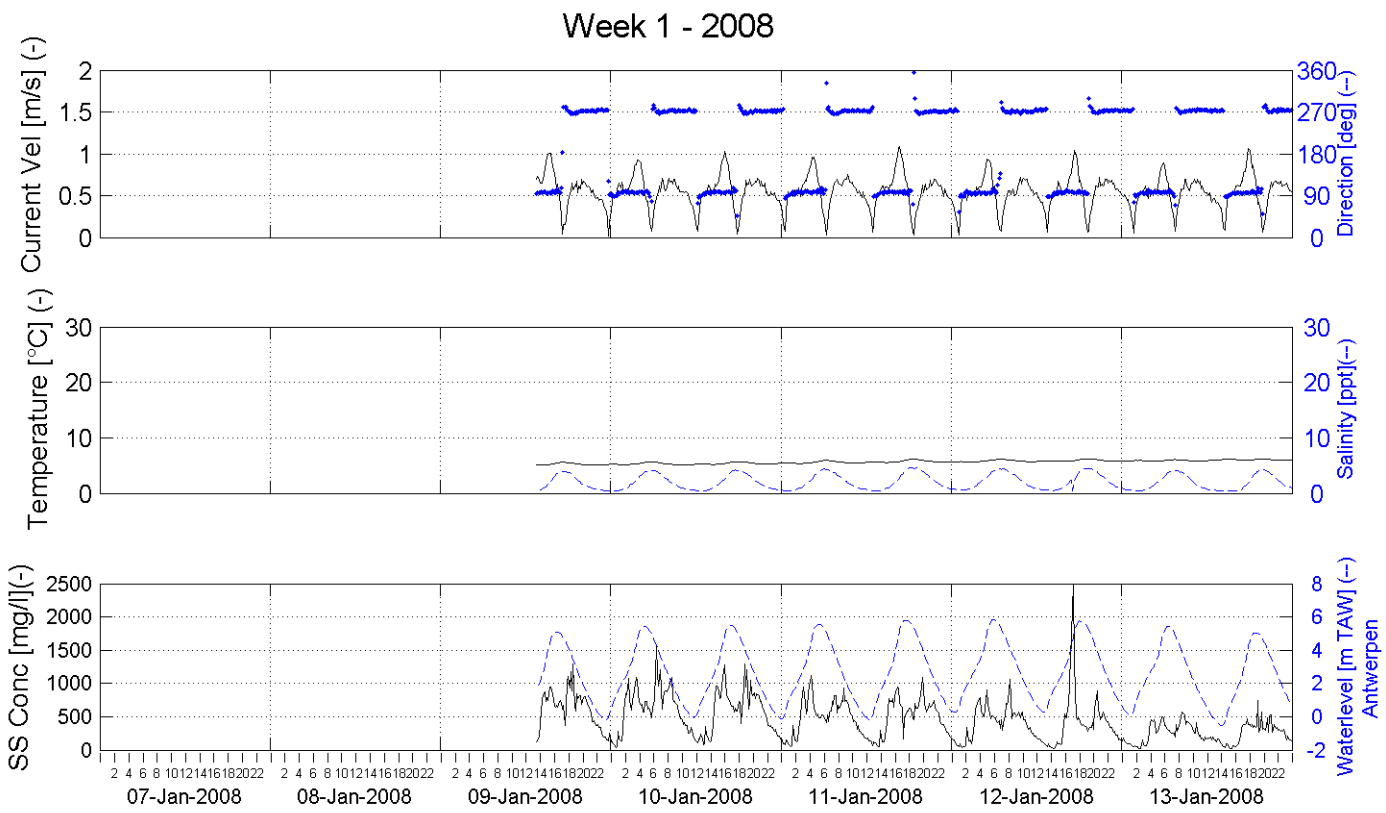
IMDC

In Association with:

I/RA/11283/07.100/MSA

C.1.2. Oosterweel left bank bottom

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Oosterweel (left bank) - 1m above bottom (-5.5m TAW)

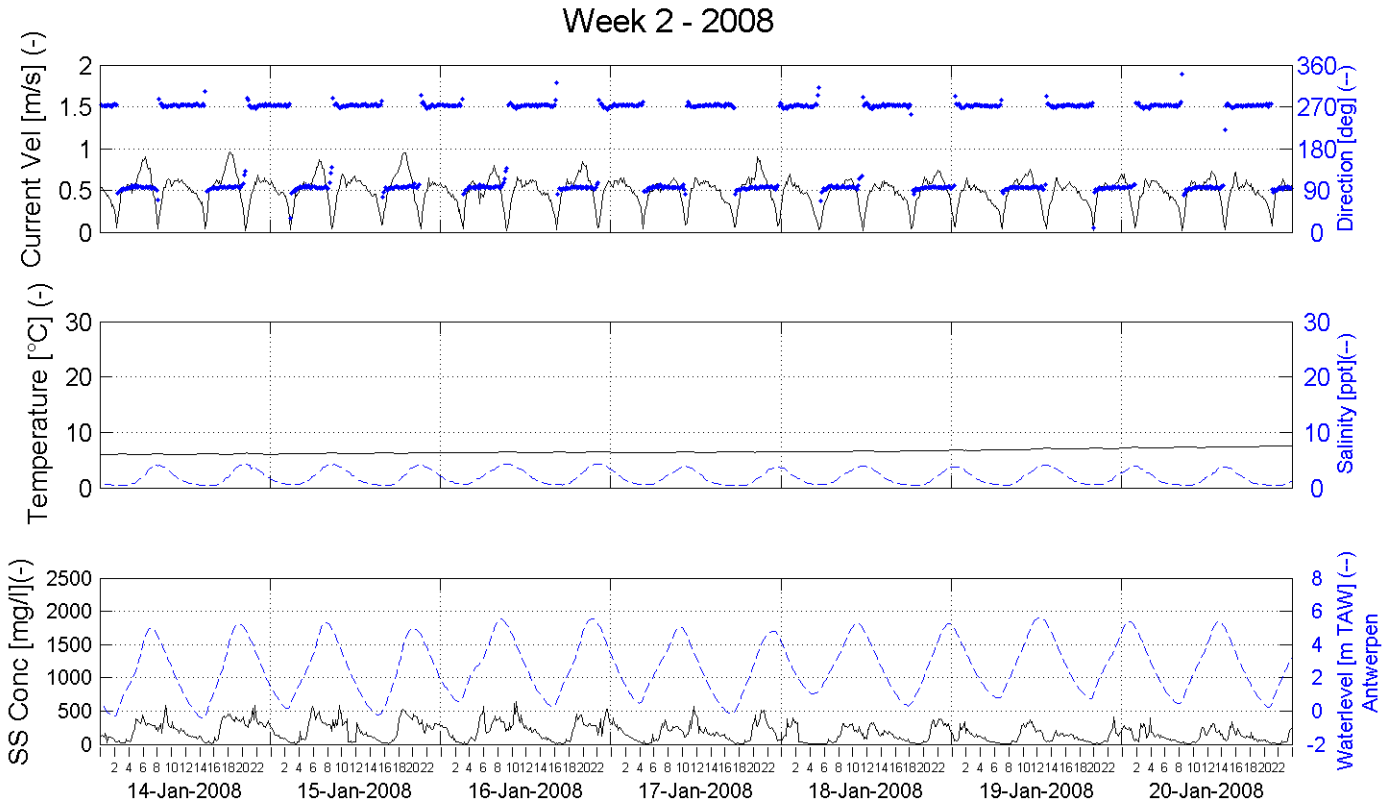
Processed by:

IMDC

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Oosterweel (left bank) - 1m above bottom (-5.5m TAW)

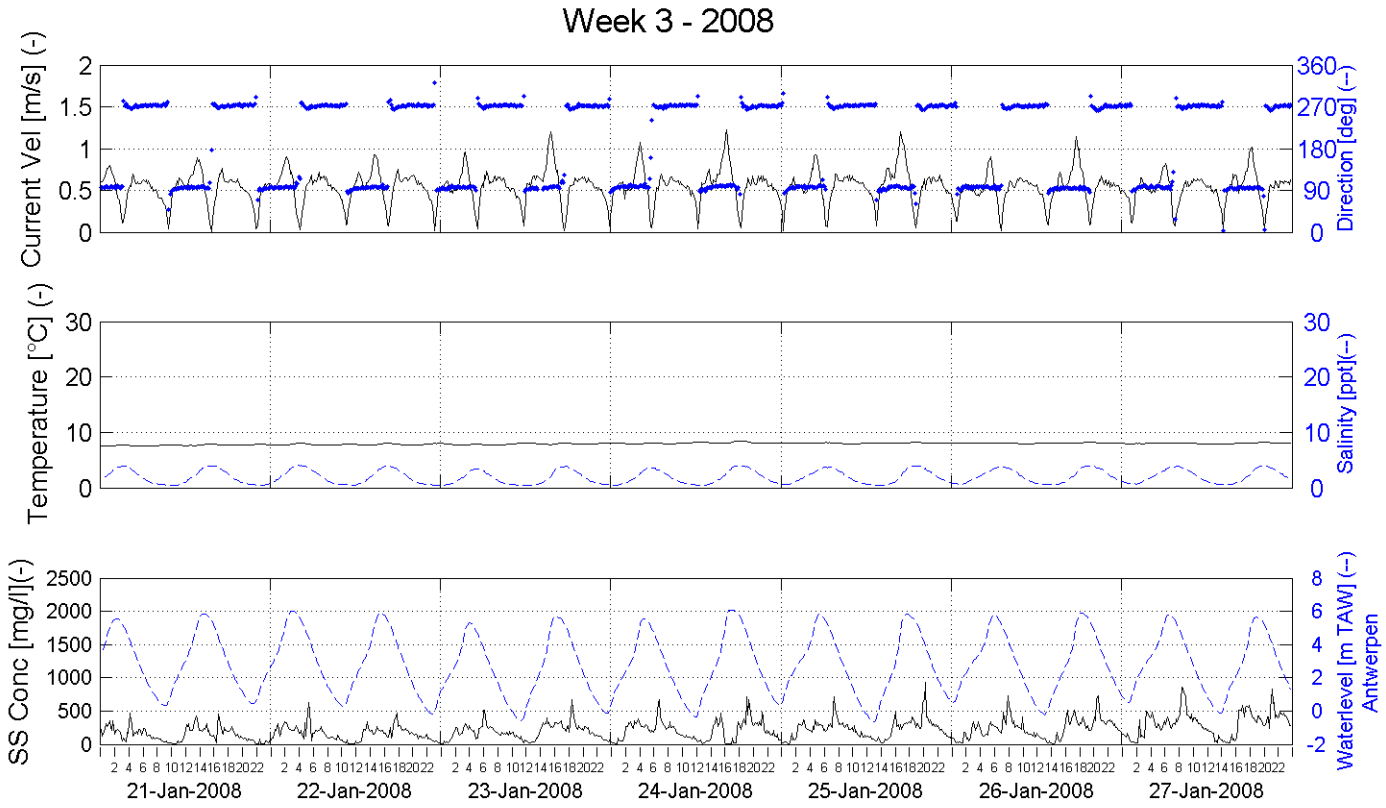
Processed by:

IMDC

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Oosterweel (left bank) - 1m above bottom (-5.5m TAW)

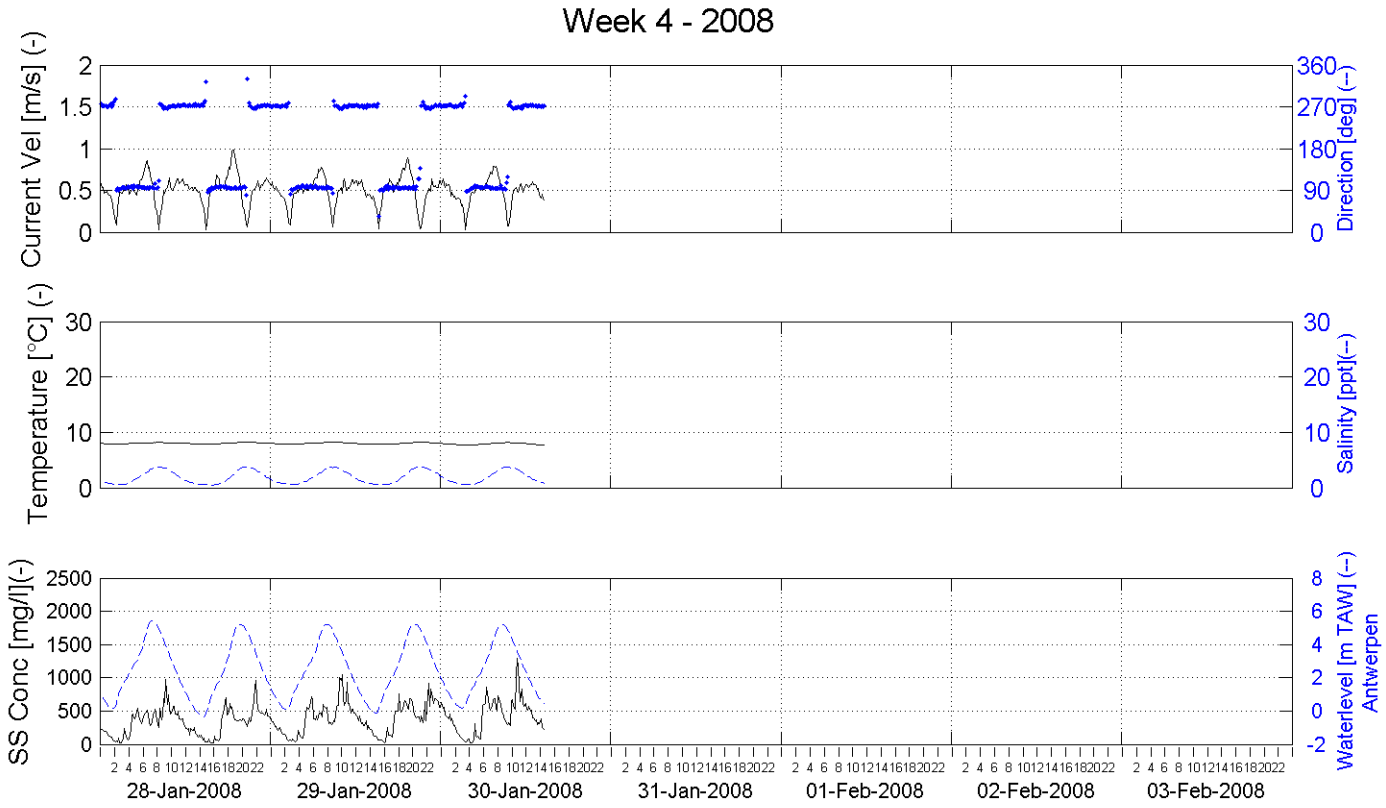
Processed by:

IMDC

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Oosterweel (left bank) - 1m above bottom (-5.5m TAW)

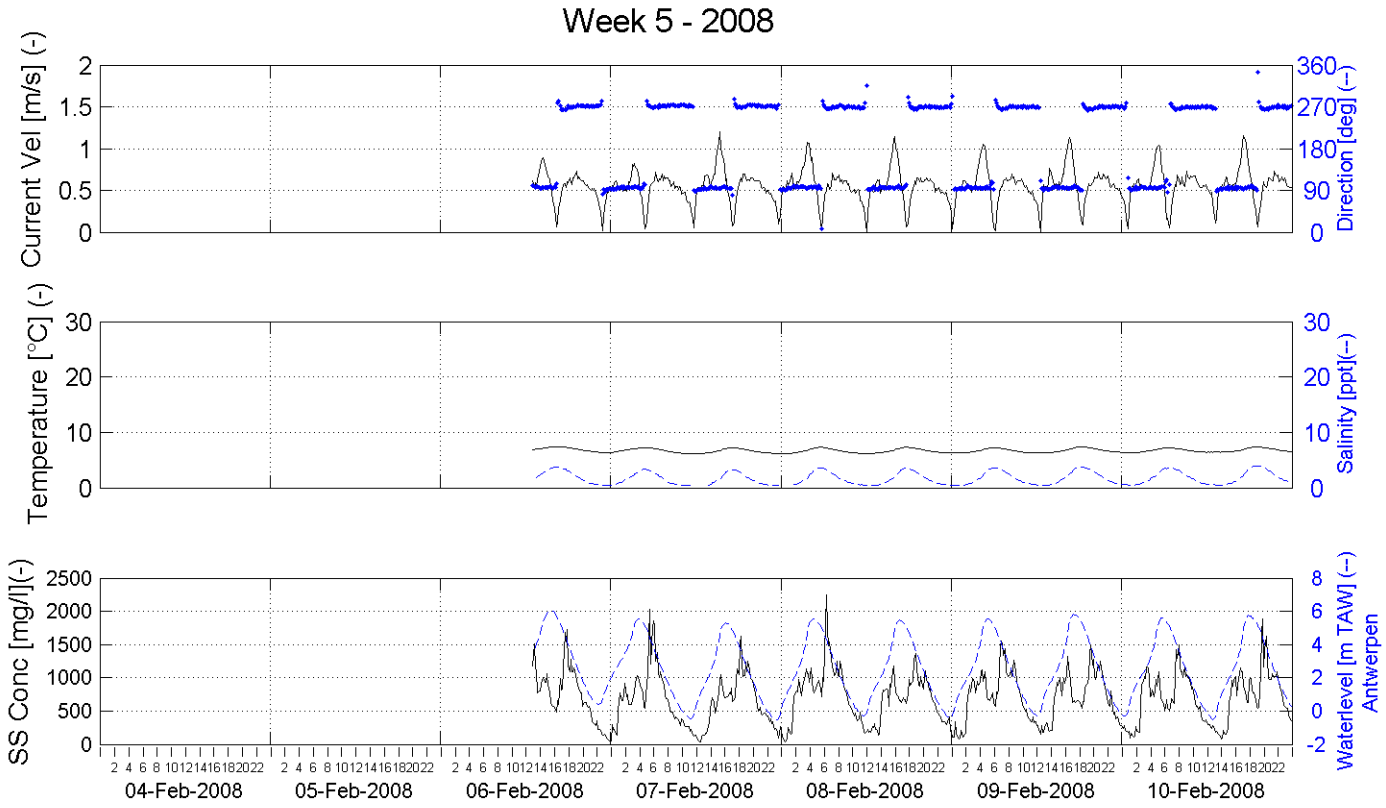
Processed by:

IMDC

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Oosterweel (left bank) - 1m above bottom (-5.5m TAW)

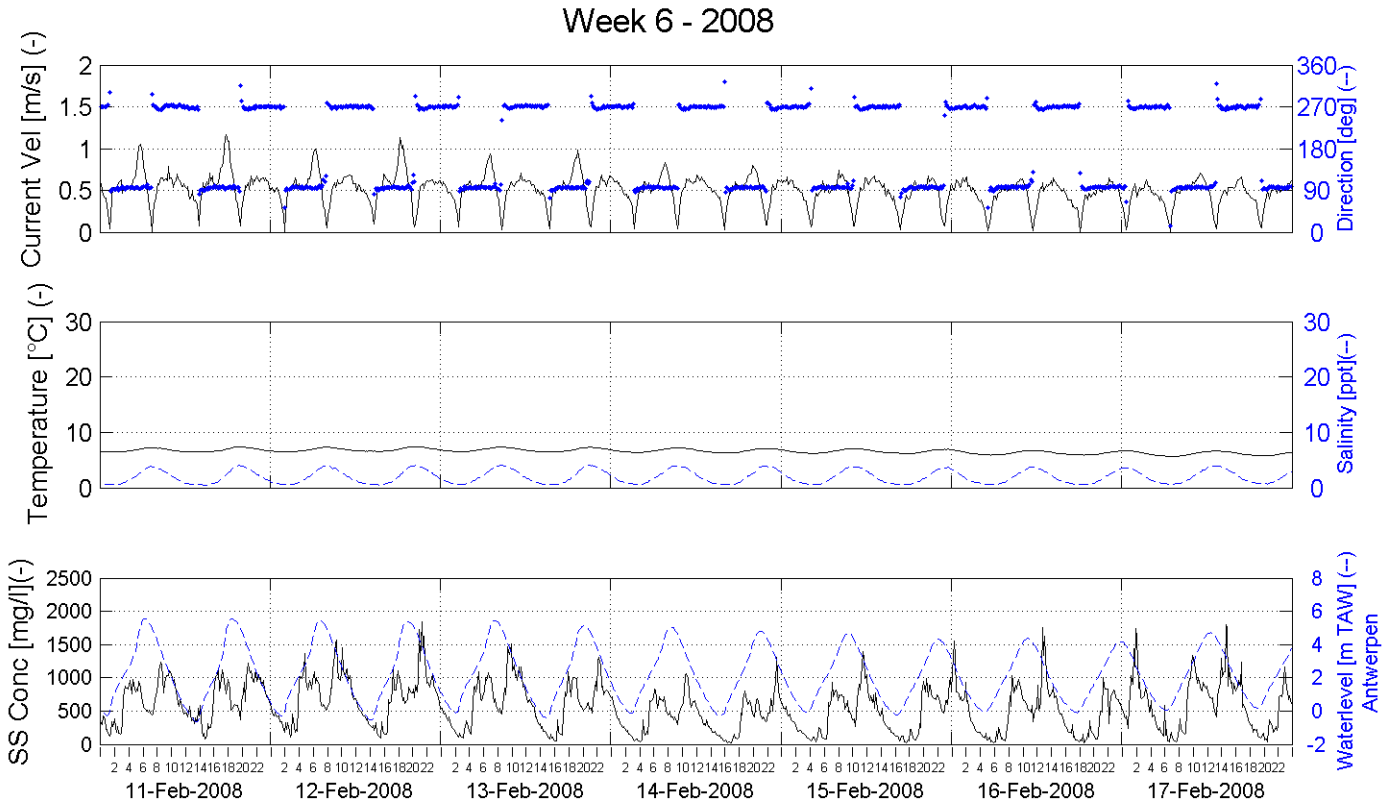
Processed by:

IMDC

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Oosterweel (left bank) - 1m above bottom (-5.5m TAW)

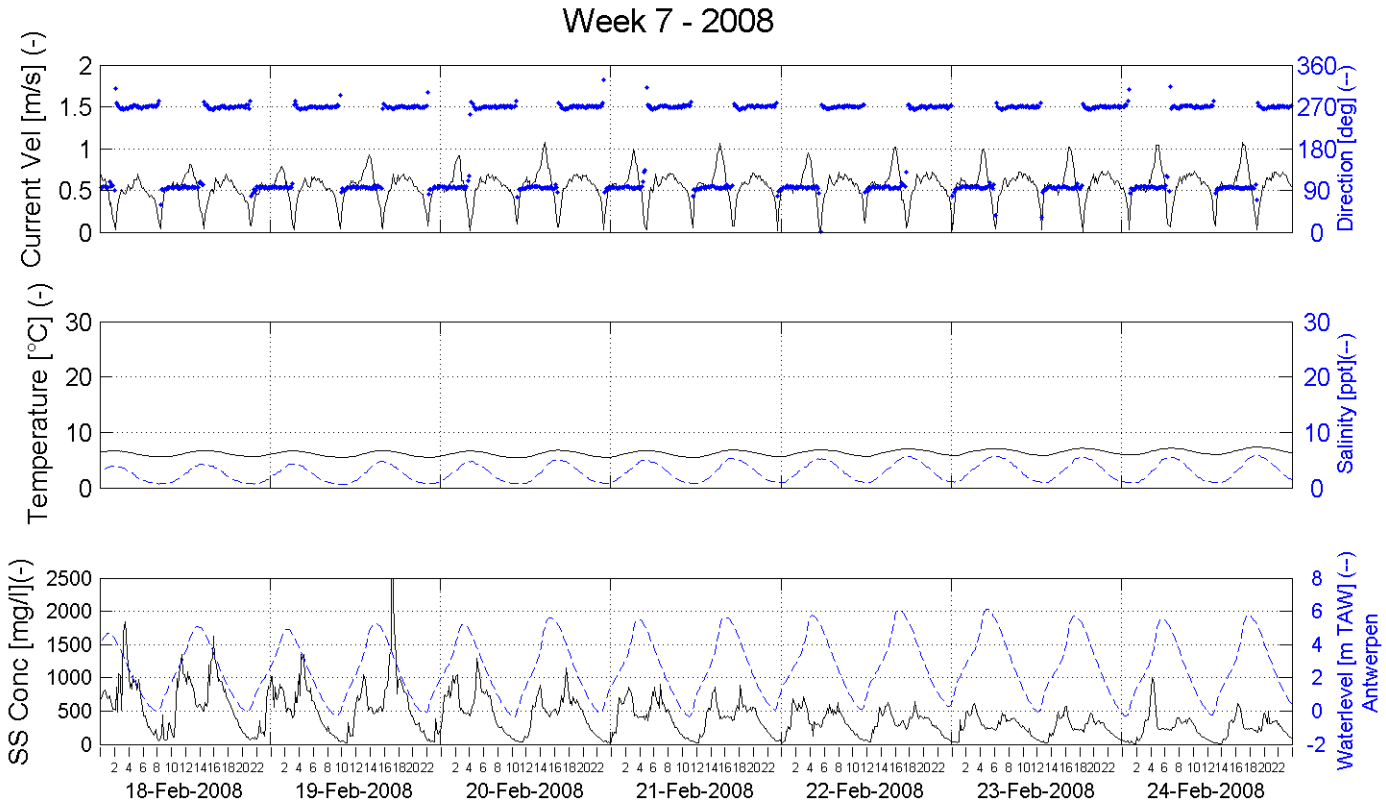
Processed by:

IMDC

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Oosterweel (left bank) - 1m above bottom (-5.5m TAW)

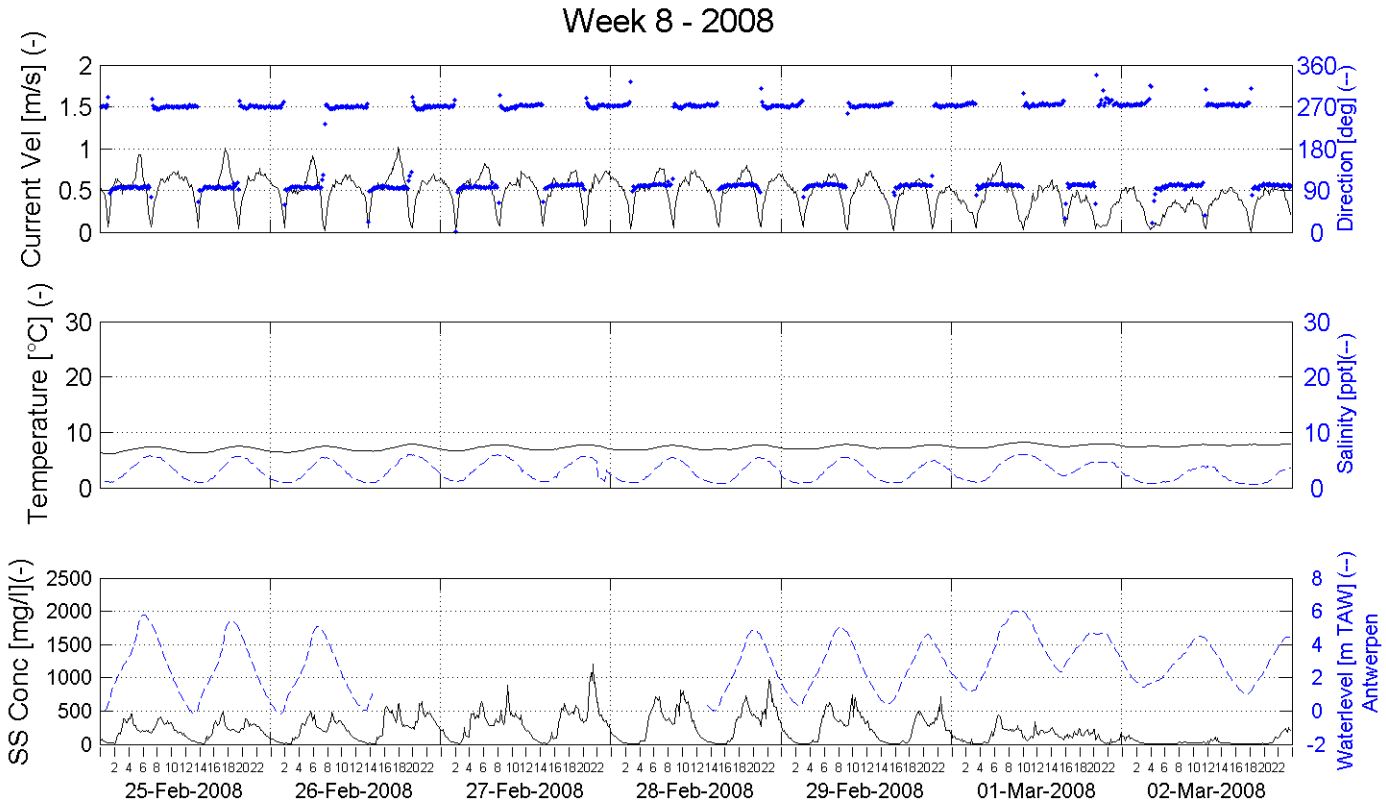
Processed by:

IMDC

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Oosterweel (left bank) - 1m above bottom (-5.5m TAW)

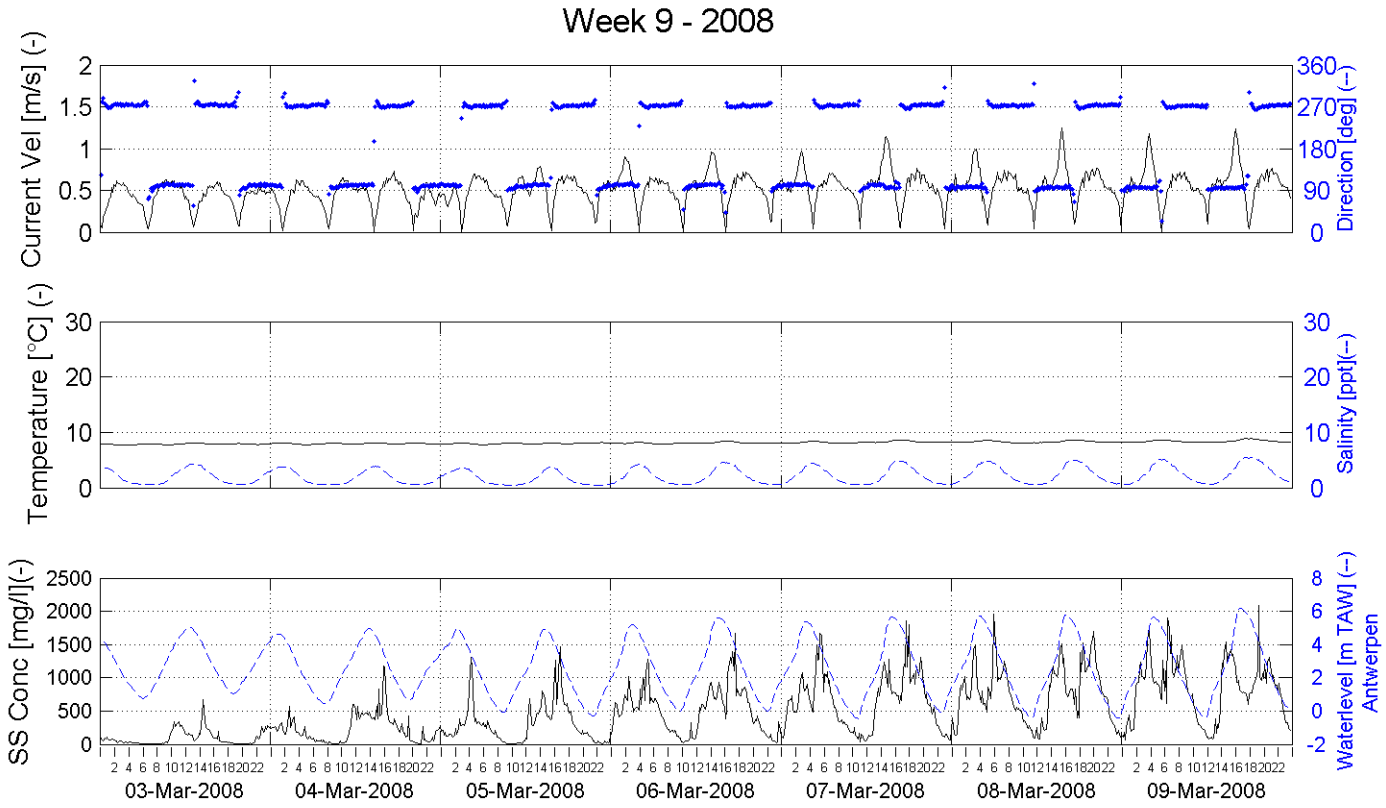
Processed by:

IMDC

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Oosterweel (left bank) - 1m above bottom (-5.5m TAW)

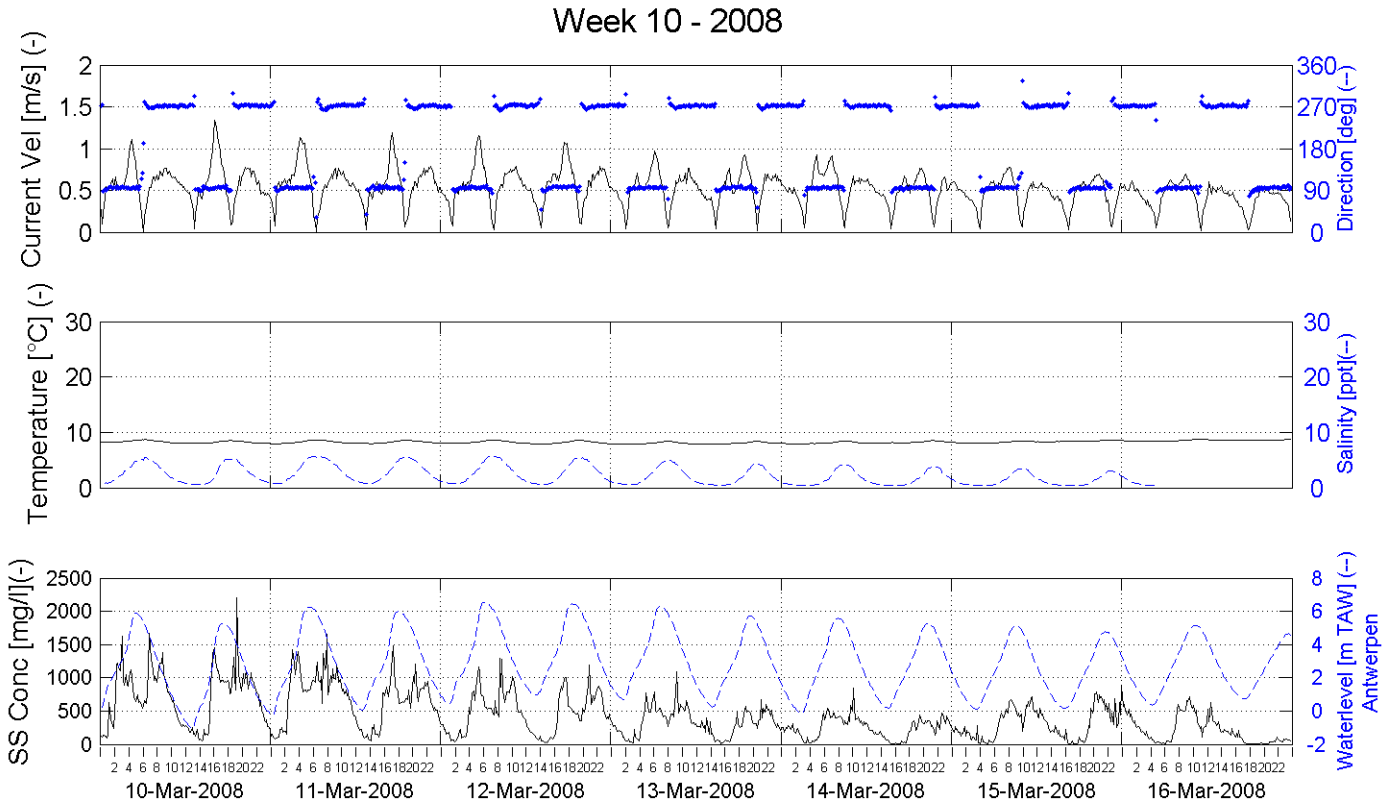
Processed by:

IMDC

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Oosterweel (left bank) - 1m above bottom (-5.5m TAW)

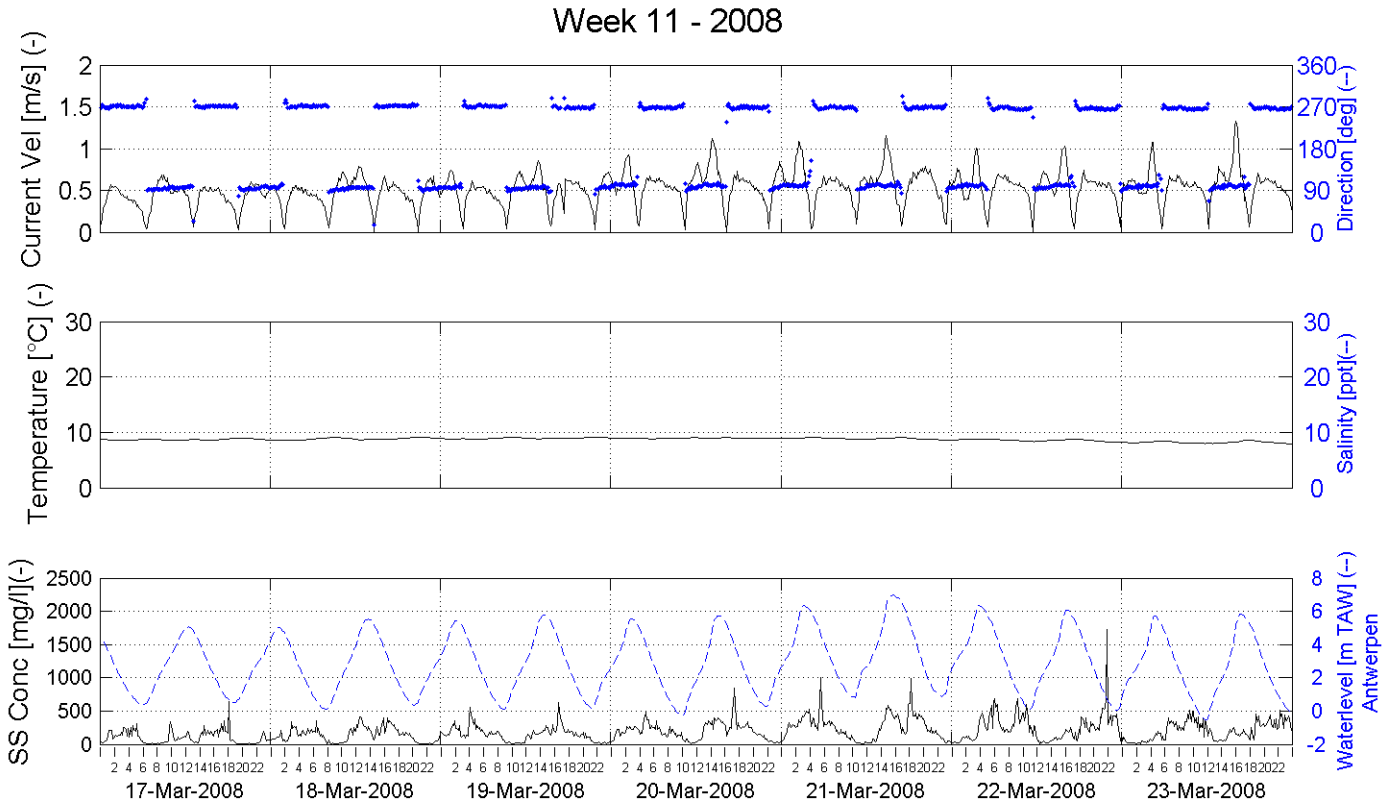
Processed by:

IMDC

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Oosterweel (left bank) - 1m above bottom (-5.5m TAW)

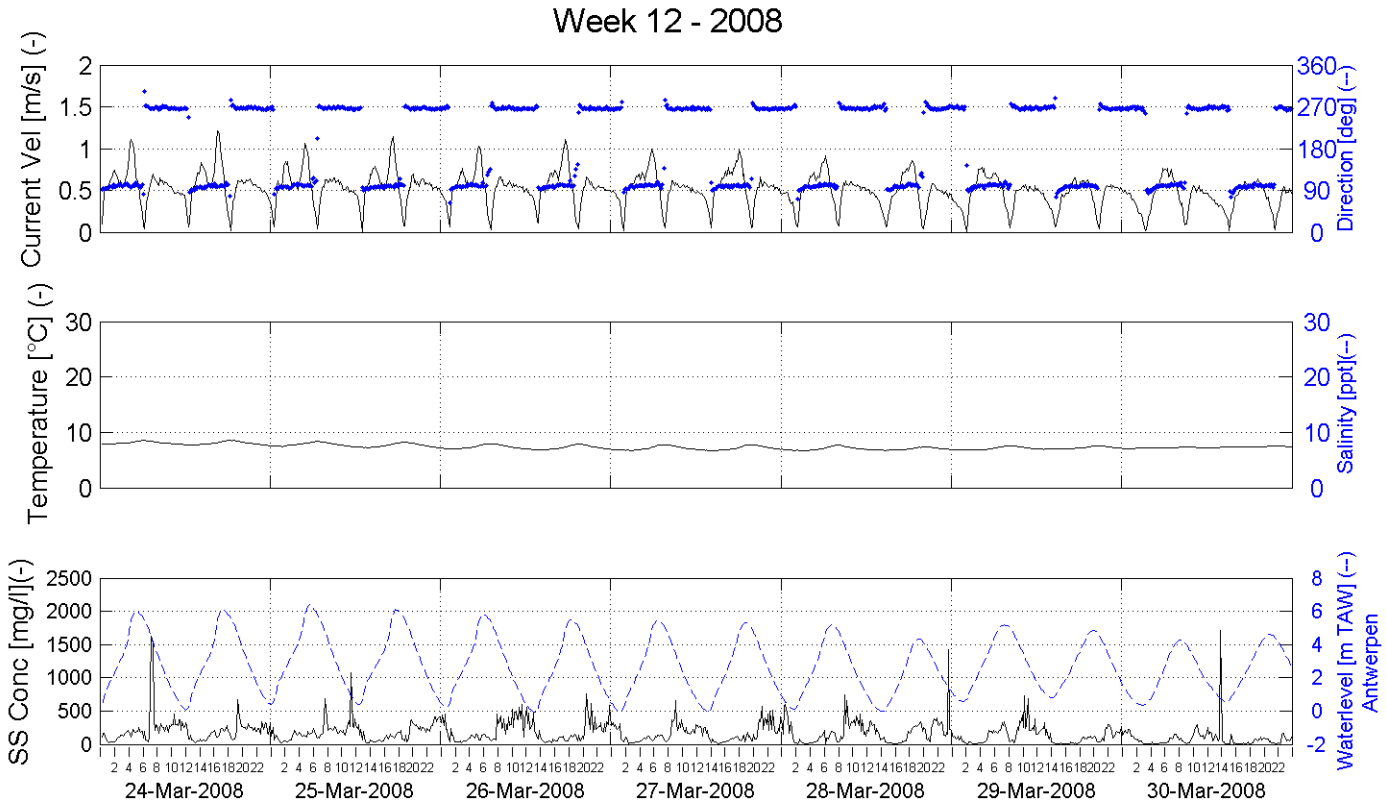
Processed by:

IMDC

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Oosterweel (left bank) - 1m above bottom (-5.5m TAW)

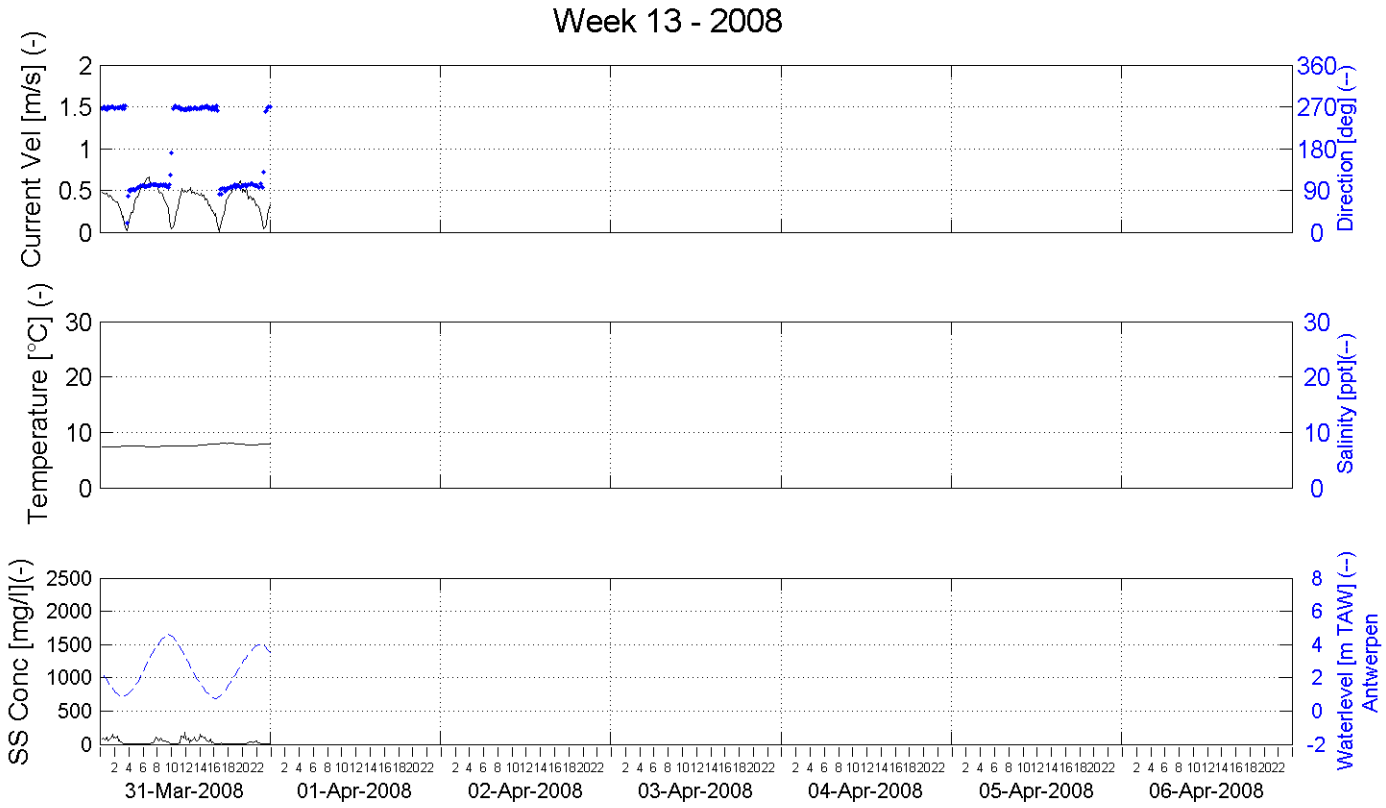
Processed by:

IMDC

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008



Week series Current Velocity, Current Direction, Temperature, Salinity, SS Concentration and Tide

Location:

Oosterweel (left bank) - 1m above bottom (-5.5m TAW)

Processed by:

IMDC

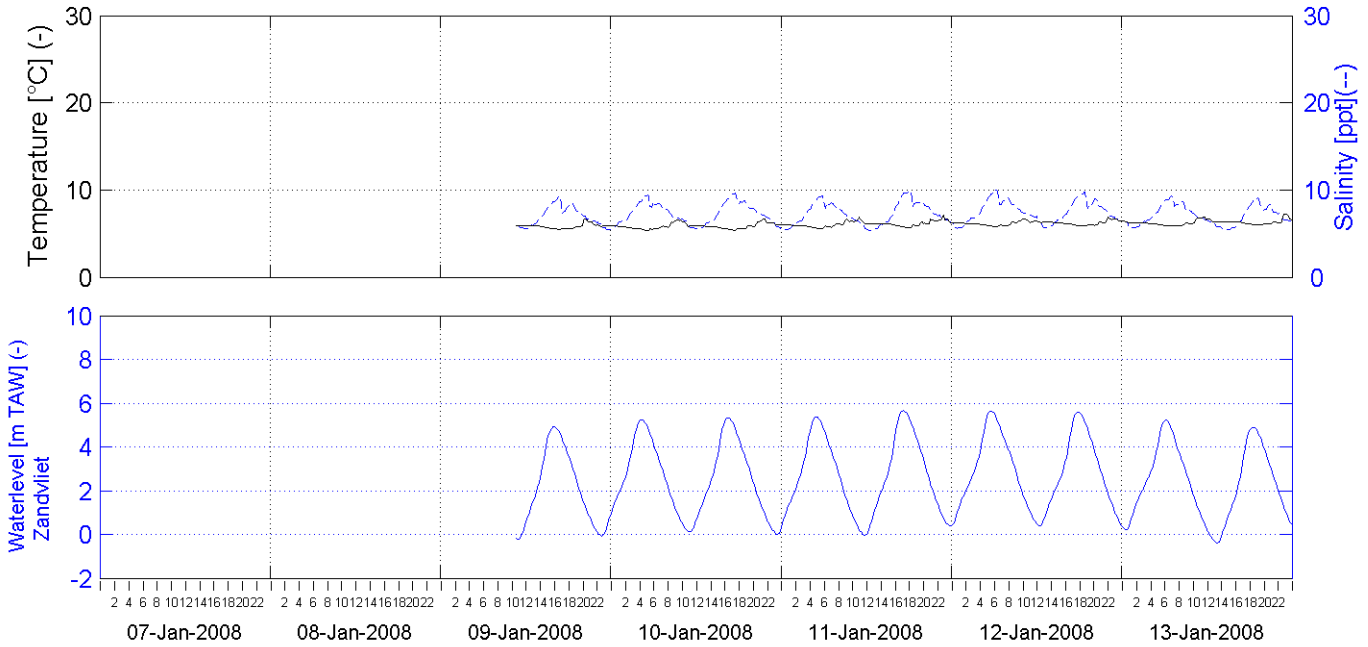
In Association with:

I/RA/11283/07.100/MSA

C.1.3. Prosperpolder

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008

Week 1 - 2008



Week series of Temperature, Salinity and Tide

Location:

Prosperpolder 2.5m above bottom (-1.5m TAW)

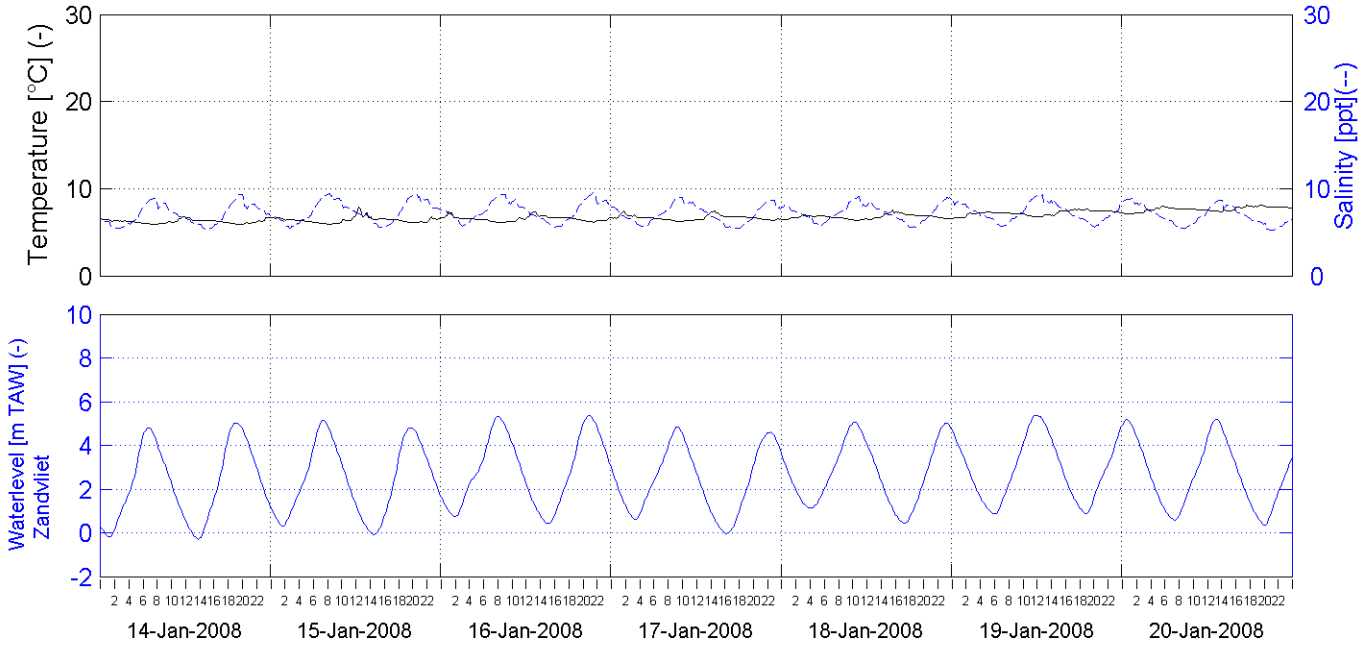
Processed by:

In Association with:

I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008

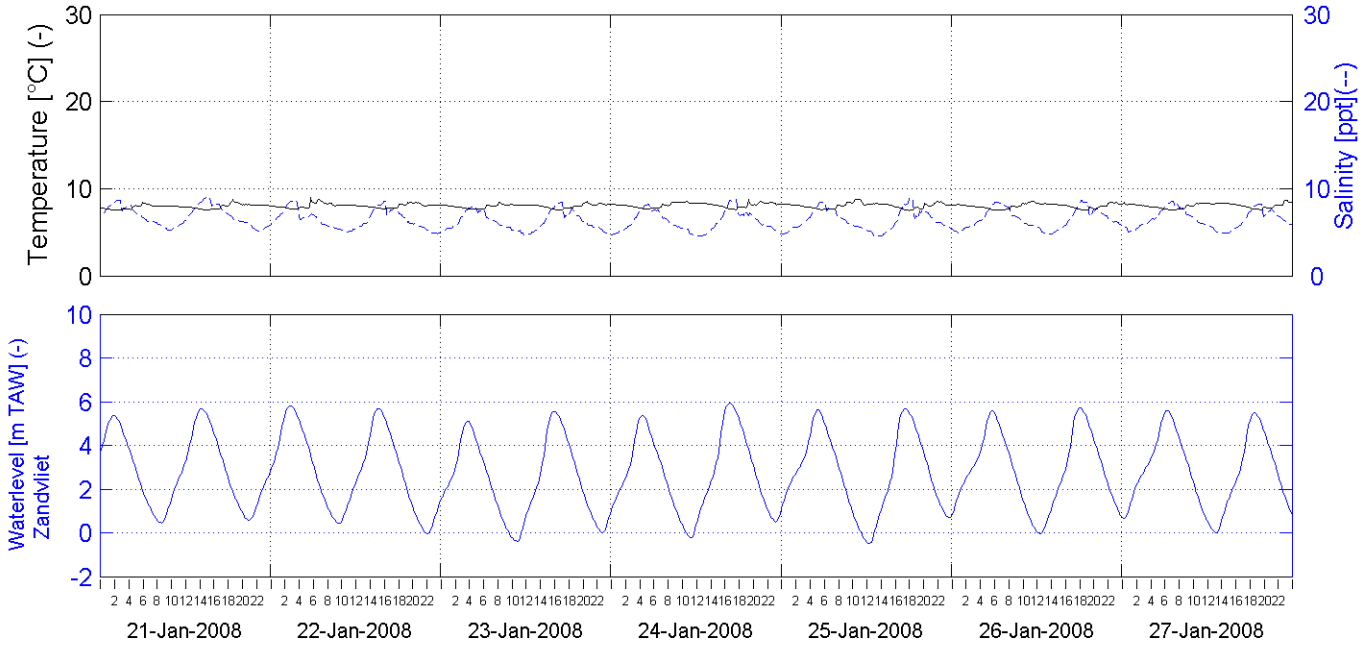
Week 2 - 2008



Week series of Temperature, Salinity and Tide	Processed by: IMDC
Location: Prosperpolder 2.5m above bottom (-1.5m TAW)	In Association with: I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008

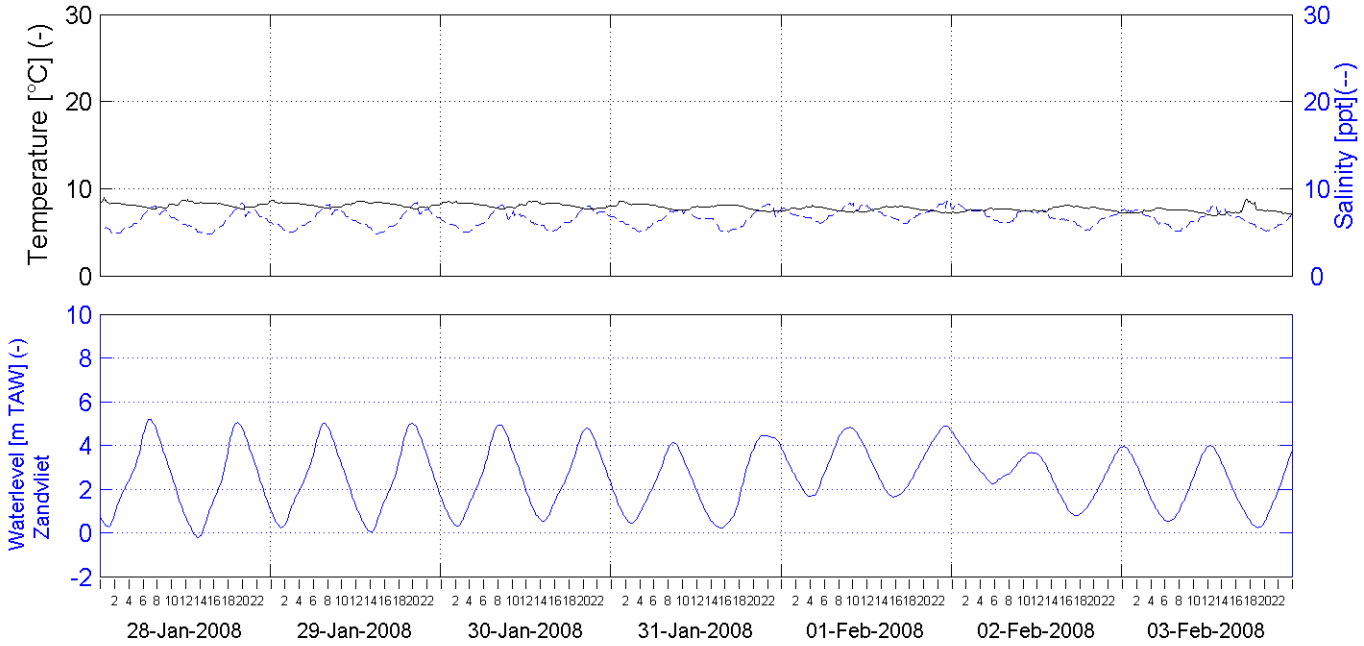
Week 3 - 2008



Week series of Temperature, Salinity and Tide	Processed by: IMDC
Location: Prosperpolder 2.5m above bottom (-1.5m TAW)	In Association with: I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008

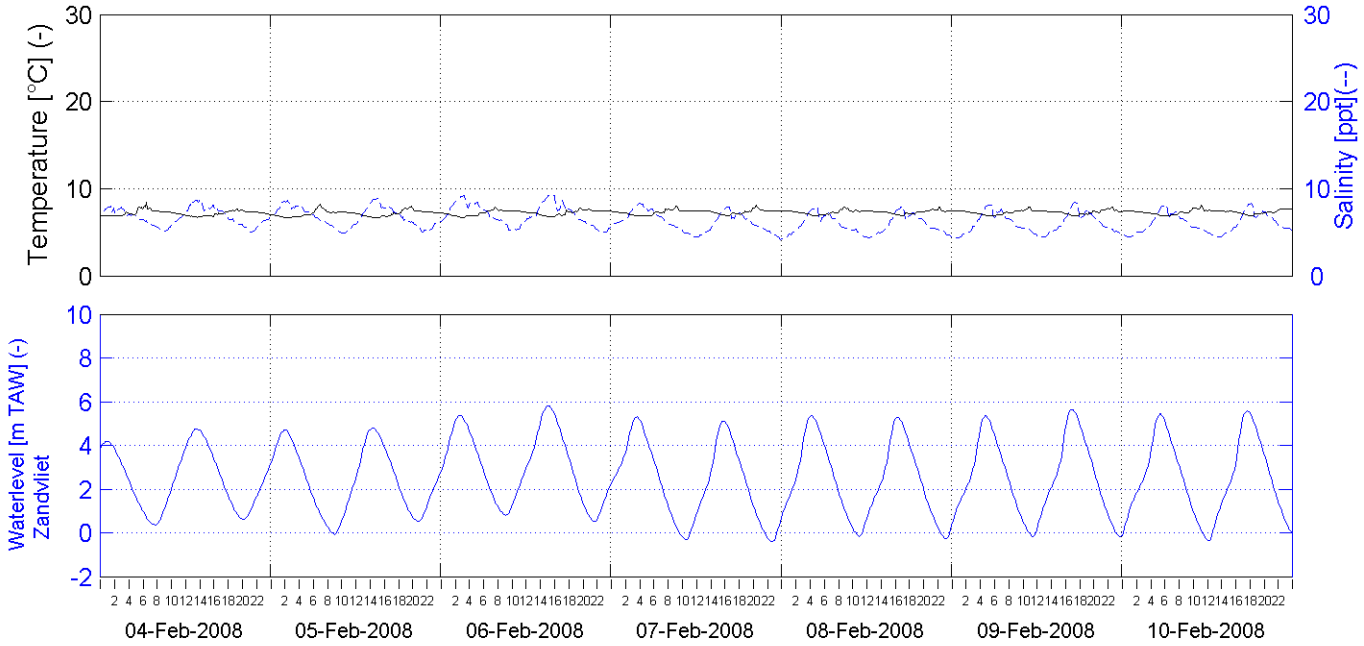
Week 4 - 2008



Week series of Temperature, Salinity and Tide	Processed by: IMDC
Location: Prosperpolder 2.5m above bottom (-1.5m TAW)	In Association with: GEMS I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008

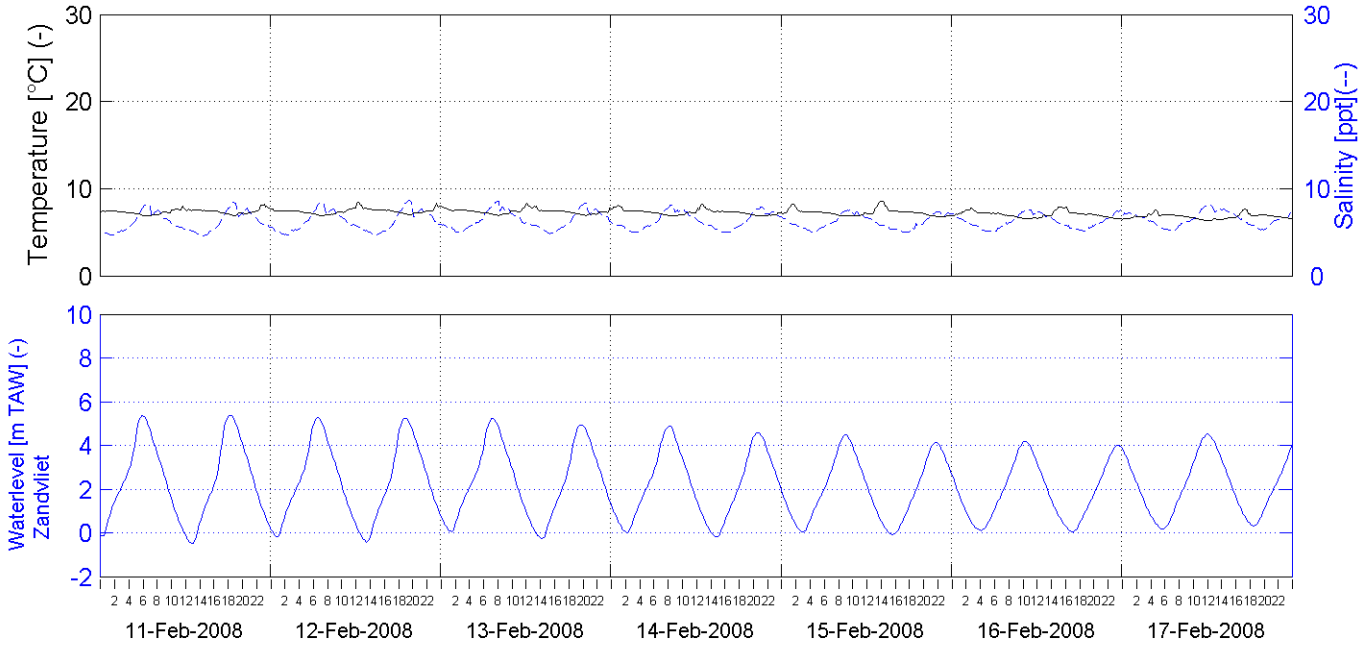
Week 5 - 2008



Week series of Temperature, Salinity and Tide	Processed by: IMDC
Location: Prosperpolder 2.5m above bottom (-1.5m TAW)	In Association with: GEMS I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008

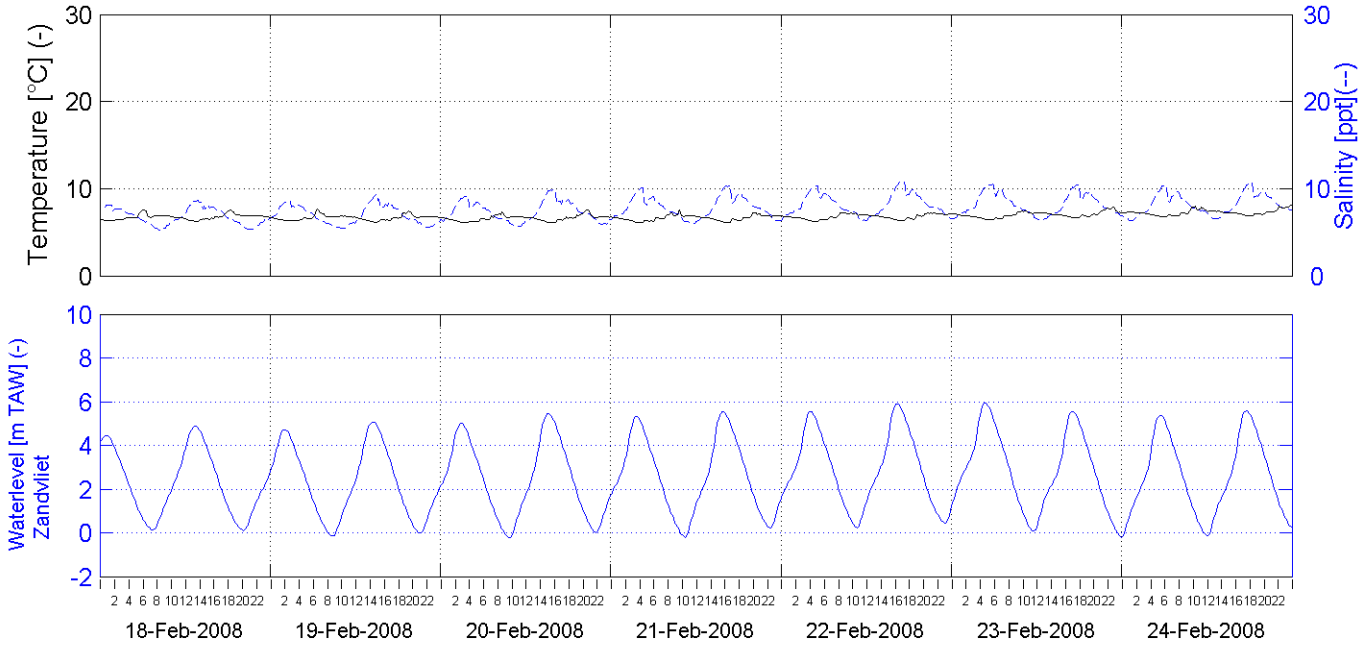
Week 6 - 2008



Week series of Temperature, Salinity and Tide	Processed by: IMDC
Location: Prosperpolder 2.5m above bottom (-1.5m TAW)	In Association with: I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008

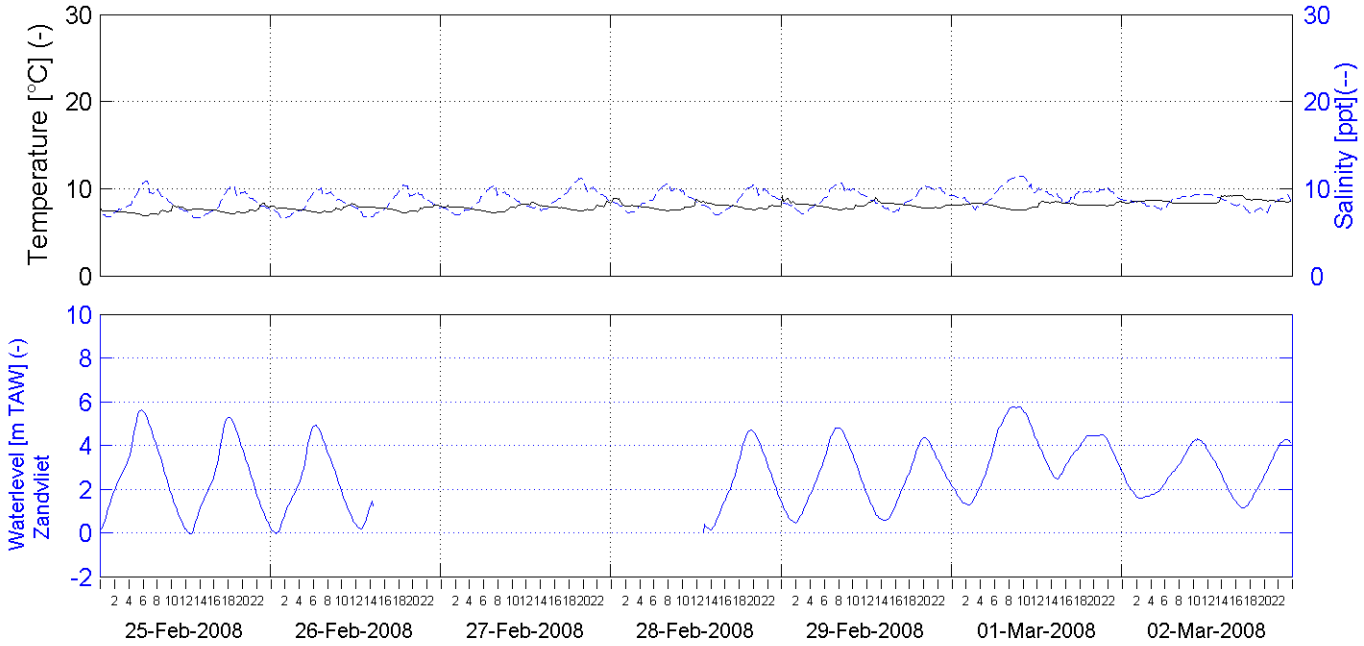
Week 7 - 2008



Week series of Temperature, Salinity and Tide	Processed by: IMDC
Location: Prosperpolder 2.5m above bottom (-1.5m TAW)	In Association with: I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008

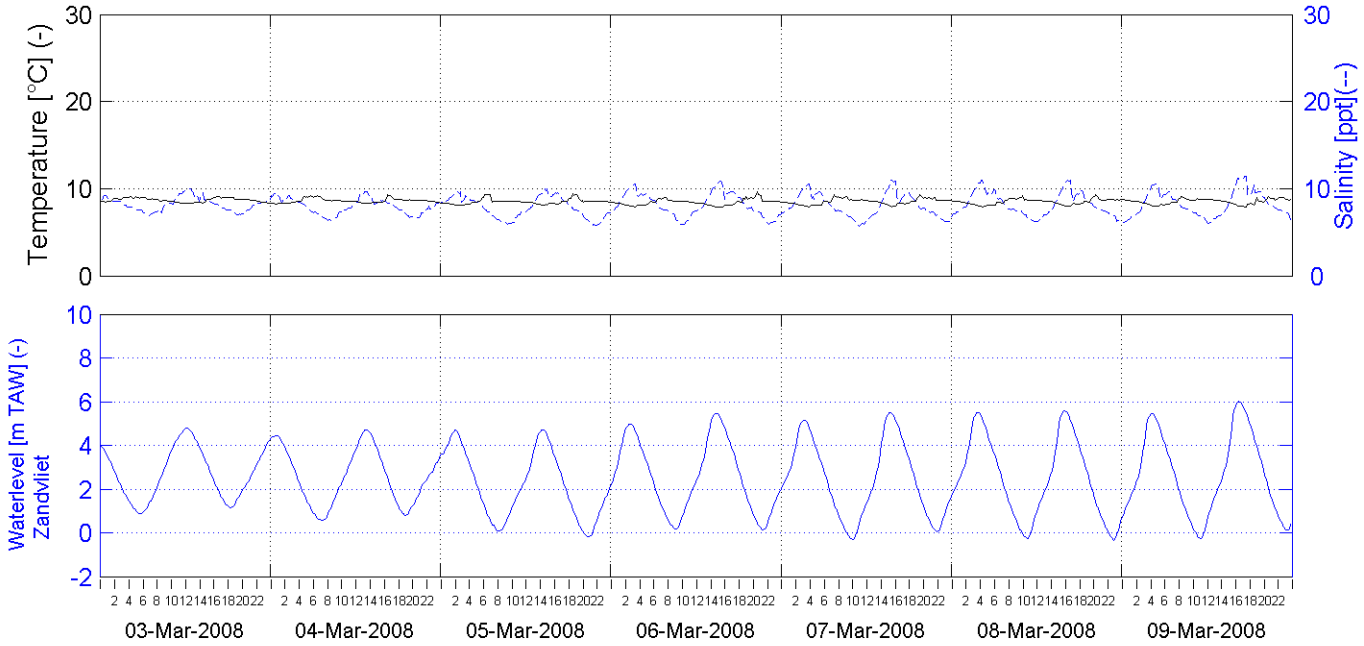
Week 8 - 2008



Week series of Temperature, Salinity and Tide	Processed by: IMDC
Location: Prosperpolder 2.5m above bottom (-1.5m TAW)	In Association with: GEMS I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008

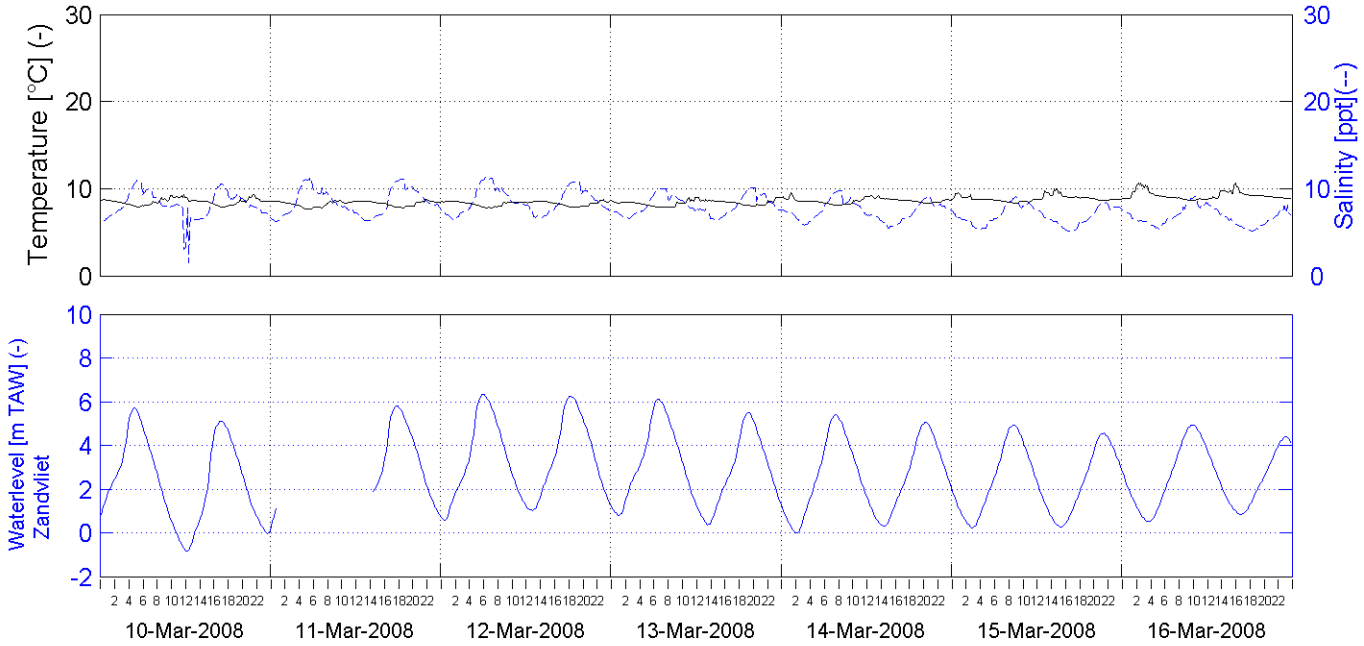
Week 9 - 2008



Week series of Temperature, Salinity and Tide	Processed by: IMDC
Location: Prosperpolder 2.5m above bottom (-1.5m TAW)	In Association with: I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008

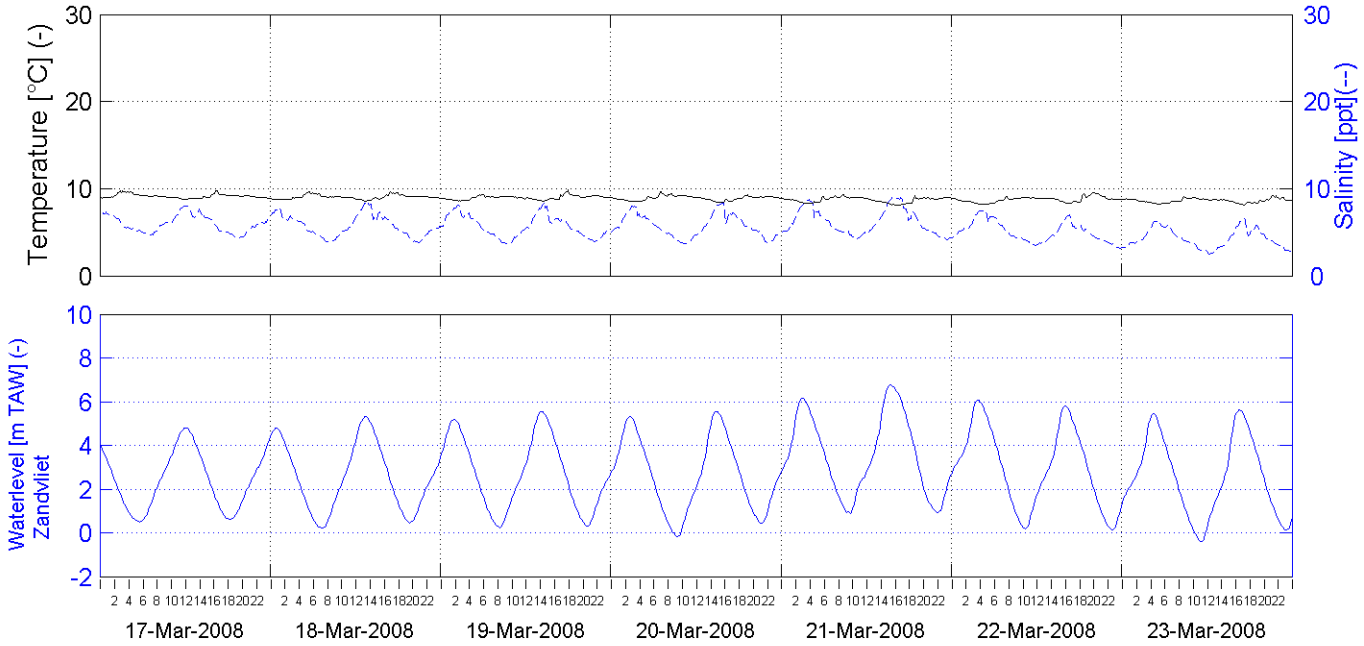
Week 10 - 2008



Week series of Temperature, Salinity and Tide	Processed by: IMDC
Location: Prosperpolder 2.5m above bottom (-1.5m TAW)	In Association with: I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008

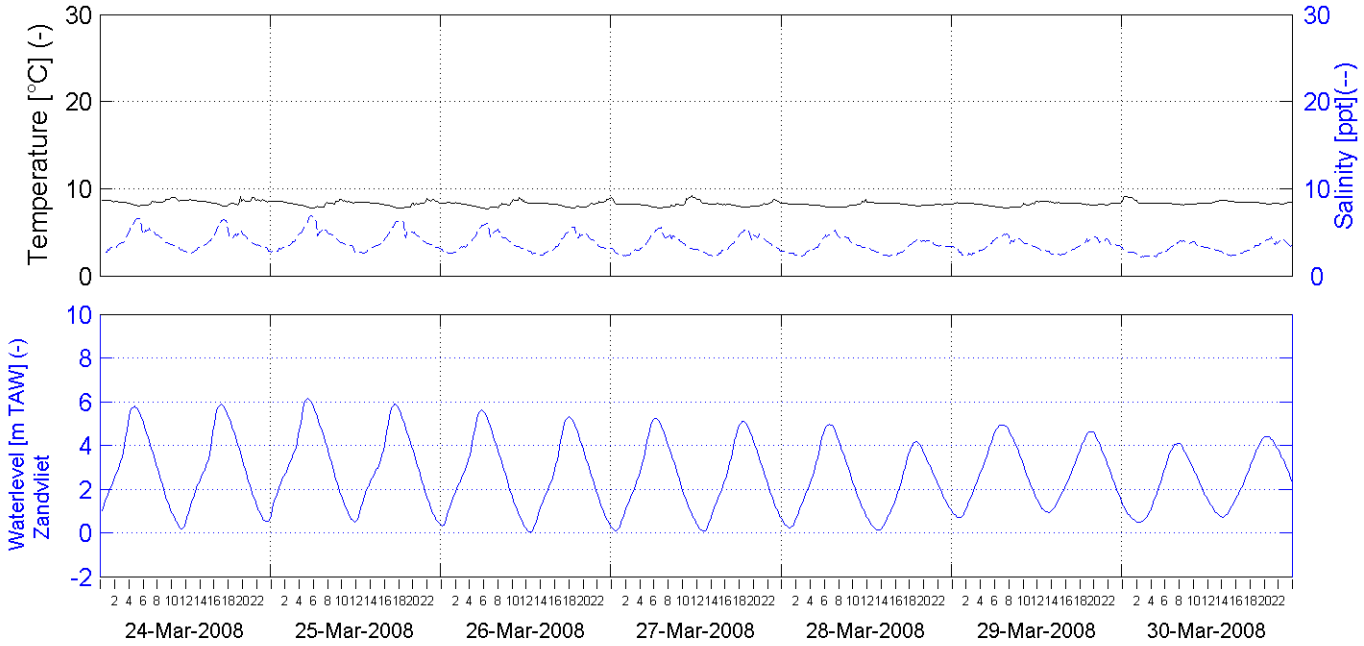
Week 11 - 2008



Week series of Temperature, Salinity and Tide	Processed by: IMDC
Location: Prosperpolder 2.5m above bottom (-1.5m TAW)	In Association with: I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008

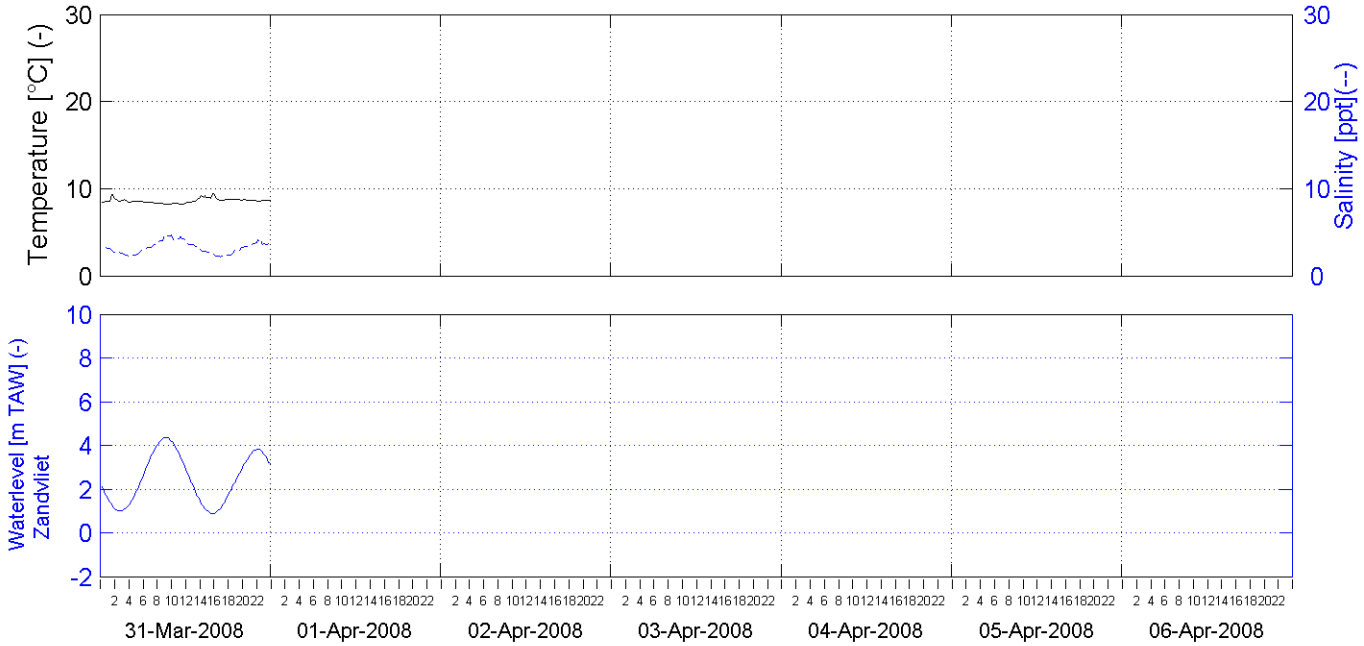
Week 12 - 2008



Week series of Temperature, Salinity and Tide	Processed by: IMDC
Location: Prosperpolder 2.5m above bottom (-1.5m TAW)	In Association with: I/RA/11283/07.100/MSA

Boundary conditions: Three monthly report 01/01/2008 – 31/03/2008

Week 13 - 2008



Week series of Temperature, Salinity and Tide	Processed by: IMDC
Location: Prosperpolder 2.5m above bottom (-1.5m TAW)	In Association with: I/RA/11283/07.100/MSA

C.2 Monthly results Minimum, Maximum and Average Velocity Magnitude, Temperature, Salinity & Suspended Sediment Concentration

Location: Oosterweel left bank
4.5 meter above bottom [-1.8 m TAW]

Velocity magnitude [m/s]			
Month	***Minimum***	***Maximum***	***Average***
April 2007	0.00	1.18	0.60
May 2007	0.01*	1.10*	0.64*
June 2007	0.01*	1.03*	0.63*
July 2007	0.00*	1.22*	0.69*
August 2007	0.01*	1.35*	0.66*
September 2007	0.00	1.47	0.65
October 2007	0.01*	1.10*	0.65*
November 2007	0.01*	1.26*	0.67*
December 2007	0.01	1.22	0.64
January 2008	0.01	1.43	0.66
February 2008	0.01	1.48	0.68
March 2008	0.00	1.54	0.63
Temperature [°C]			
Month	***Minimum***	***Maximum***	***Average***
January 2007	6.1	9.4	7.9
February 2007	6.2*	8.2*	7.0*
March 2007	8.9*	10.5*	9.5*
April 2007	9.6	16.1	12.7
May 2007	16.1*	17.6*	16.8*
June 2007	19.5*	21.5*	20.6*
July 2007	18.6*	20.7*	19.5*
August 2007	19.2*	20.9*	20.2*
September 2007	16.0	20.1	18.3
October 2007	13.9*	16.7*	15.5*
November 2007	7.3*	11.0*	8.8*
December 2007	3.6	8.8	6.7
January 2008	4.2	8.5	6.4
February 2008	5.4	8.0	6.6
March 2008	6.7	9.2	8.0

-: No data or less than 30% of the monthly data available.
*: Less than 70% of the monthly data available.

Salinity [ppt]						
Month	***Minimum***		***Maximum***		***Average***	
	HW	***LW***	***HW***	***LW***	***HW***	***LW***
April 2007	3.6	0.8	7.7	2.2	5.8	1.3
May 2007	8.3*	1.7*	9.4*	3.2*	8.8*	2.4*
June 2007	8.3*	1.1*	9.0*	2.0*	8.7*	1.4*
July 2007	7.3*	0.9*	9.2*	1.6*	8.2*	1.2*
August 2007	5.9*	0.9*	8.5*	2.0*	7.4*	1.4*
September 2007	7.8	1.6	10.2	3.2	9.0	2.4
October 2007	6.6*	1.0*	9.1*	1.9*	8.3*	1.3*
November 2007	5.2*	0.5*	8.1*	1.6*	6.7*	0.8*
December 2007	1.5	0.4	7.4	1.1	3.5	0.7
January 2008	3.4	0.4	4.6	0.8	4.0	0.5
February 2008	3.3	0.5	5.9	1.1	4.5	0.7
March 2008	-	-	-	-	-	-

Suspended sediment concentration [mg/l]			
Month	**Minimum**	**Maximum**	**Average**
April 2007	23	508	212
May 2007	9*	958*	240*
June 2007	-	-	-
July 2007	0*	423*	64*
August 2007	9*	1372*	226*
September 2007	4	1434	205
October 2007	7*	474*	88*
November 2007	3*	2184*	559*
December 2007	4	1364	184
January 2008	3	1169	179
February 2008	4	1452	376
March 2008	2	1476	209

-: No data or less than 30% of the monthly data available.
*: Less than 70% of the monthly data available.

Location: Oosterweel left bank
1.0 meter above bottom [-5.5 m TAW]

Velocity magnitude [m/s]			
Month	***Minimum***	***Maximum***	***Average***
April 2007	0.00	1.27	0.52
May 2007	-	-	-
June 2007	-	-	-
July 2007	0.01*	0.99*	0.53*
August 2007	0.01	1.21	0.52
September 2007	0.01	1.25	0.52
October 2007	-	-	-
November 2007	-	-	-
December 2007	0.00*	0.99*	0.48*
January 2008	0.01	1.22	0.52
February 2008	0	1.20	0.53
March 2008	0	1.34	0.50
Temperature [°C]			
Month	***Minimum***	***Maximum***	***Average***
April 2007	9.7	16.1	12.8
May 2007	-	-	-
June 2007	-	-	-
July 2007	18.7*	20.9*	20.1*
August 2007	19.2	21.1	20.2
September 2007	16.0	20.1	18.3
October 2007	-	-	-
November 2007	-	-	-
December 2007	5.2*	8.7*	7.8*
January 2008	5.0	8.4	7.0
February 2008	5.4	8.0	6.6
March 2008	6.7	9.2	8.1

-: No data or less than 30% of the monthly data available.
*: Less than 70% of the monthly data available.

Salinity [ppt]						
Month	***Minimum***		***Maximum***		***Average***	
	HW	***LW***	***HW***	***LW***	***HW***	***LW***
April 2007	-	-	-	-	-	-
May 2007	-	-	-	-	-	-
June 2007	-	-	-	-	-	-
July 2007	5.3*	0.6*	8.4*	1.7*	7.2*	1.1*
August 2007	5.5	0.6	8.3	2.1	7.1	1.3
September 2007	7.8	1.8	10.2	3.3	9.0	2.5
October 2007	-	-	-	-	-	-
November 2007	-	-	-	-	-	-
December 2007	-	-	-	-	-	-
January 2008	3.4	0.4	4.5	0.7	3.9	0.5
February 2008	3.3	0.5	5.8	1.2	4.5	0.8
March 2008	-	-	-	-	-	-

Suspended sediment concentration [mg/l]			
Month	***Minimum***	***Maximum***	***Average***
April 2007	7	612	255
May 2007	-	-	-
June 2007	-	-	-
July 2007	3*	817*	66*
August 2007	1	1610	293
September 2007	7	1636	264
October 2007	-	-	-
November 2007	-	-	-
December 2007	23*	822*	255*
January 2008	3	1169	179
February 2008	4	1452	376
March 2008	2	1476	209

-: No data or less than 30% of the monthly data available.
*: Less than 70% of the monthly data available.

Location: Prosperpolder[3]
2.5 meter above bottom [-1.5 m TAW]

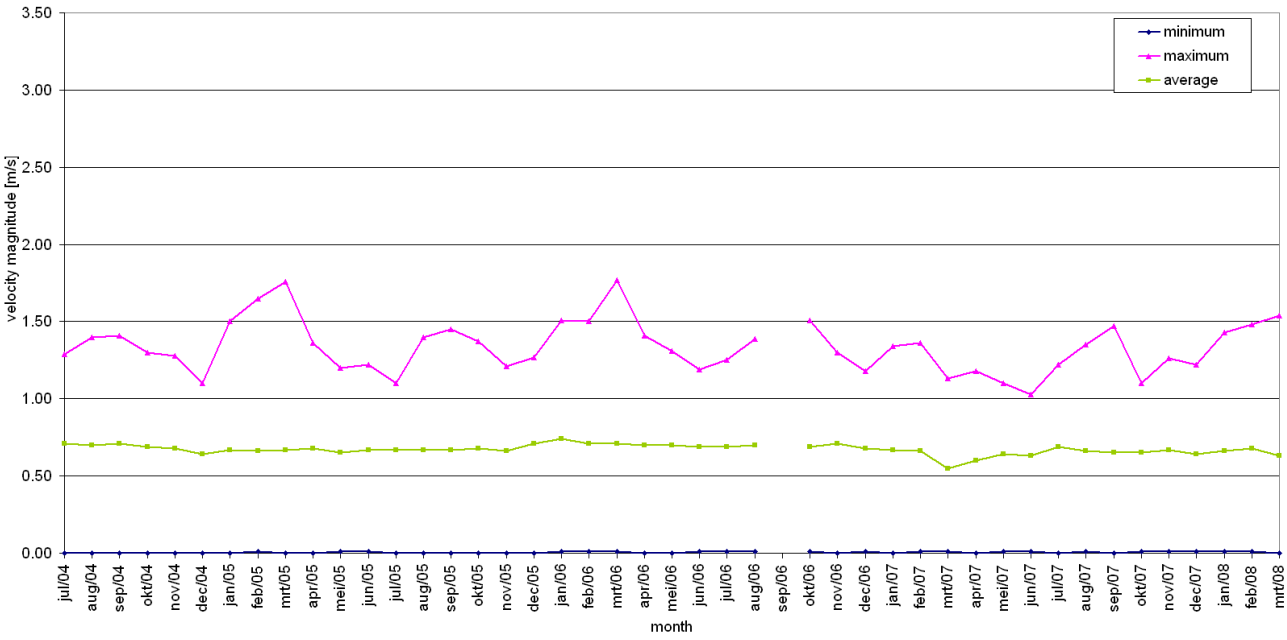
Temperature [°C]						
Month	***Minimum***		***Maximum***		***Average***	
April 2007	9.9		18.5		13.4	
May 2007	15.7*		18.4*		16.7*	
June 2007	17.4		22.3		20.0	
July 2007	18.4		22.4		19.8	
August 2007	19.4		22.2		20.4	
September 2007	16.4		20.5		18.6	
October 2007	12.6		18.6		15.6	
November 2007	8.4		14.2		11.0	
December 2007	6.3*		9.5*		8.4*	
January 2008	5.4		9.0		7.3	
February 2008	6.1		9.2		7.3	
March 2008	7.6		10.7		8.6	
Salinity [ppt]						
Month	***Minimum***		***Maximum***		***Average***	
	HW	***LW***	***HW***	***LW***	***HW***	***LW***
April 2007	7.7	4.8	12.2	9	10.2	7.2
May 2007	9.7*	8.5*	14.3*	10.4*	11.2*	9.1*
June 2007	12.8	10.2	15	12.1	13.6	10.8
July 2007	10.4*	8.2*	13.8*	11.1*	12.3*	9.6*
August 2007	9.3	7.0	13.8	10.0	11.0	8.6
September 2007	11.6	9.4	14.9	12.2	13.5	10.9
October 2007	12.6	10.3	15.9	12.3	13.9	11.1
November 2007	11.4	8.6	16.4	13.8	13.4	10.4
December 2007	5.6*	3.2*	12.5*	9.8*	8.0*	5.6*
January 2008	7.3*	4.8*	9.6*	6.6*	8.5*	5.8*
February 2008	7.2	4.8	10.5	7.8	8.6	6.0
March 2008	3.8	2.2	11.3	9.1	8.1	5.3

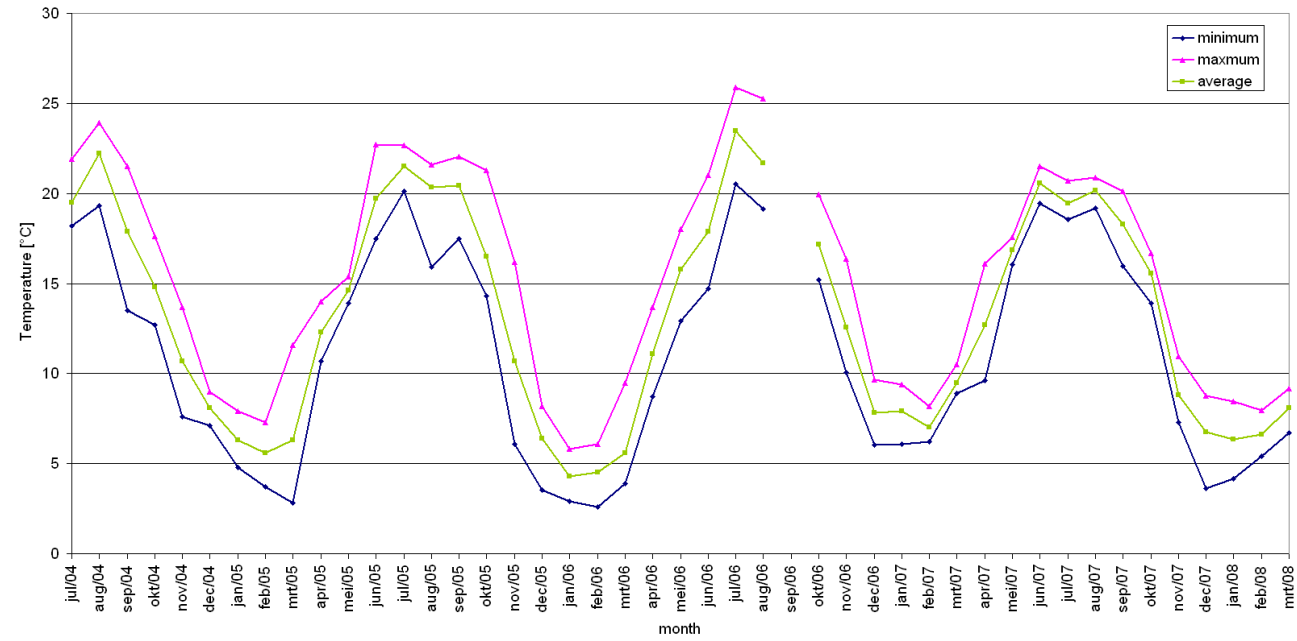
-: No data or less than 30% of the monthly data available.
*: Less than 70% of the monthly data available.

[3] Current velocity and suspended sediment were not measured at Prosperpolder.

C.3 Graphs monthly results for the whole deployment period

Velocity magnitude & temperature

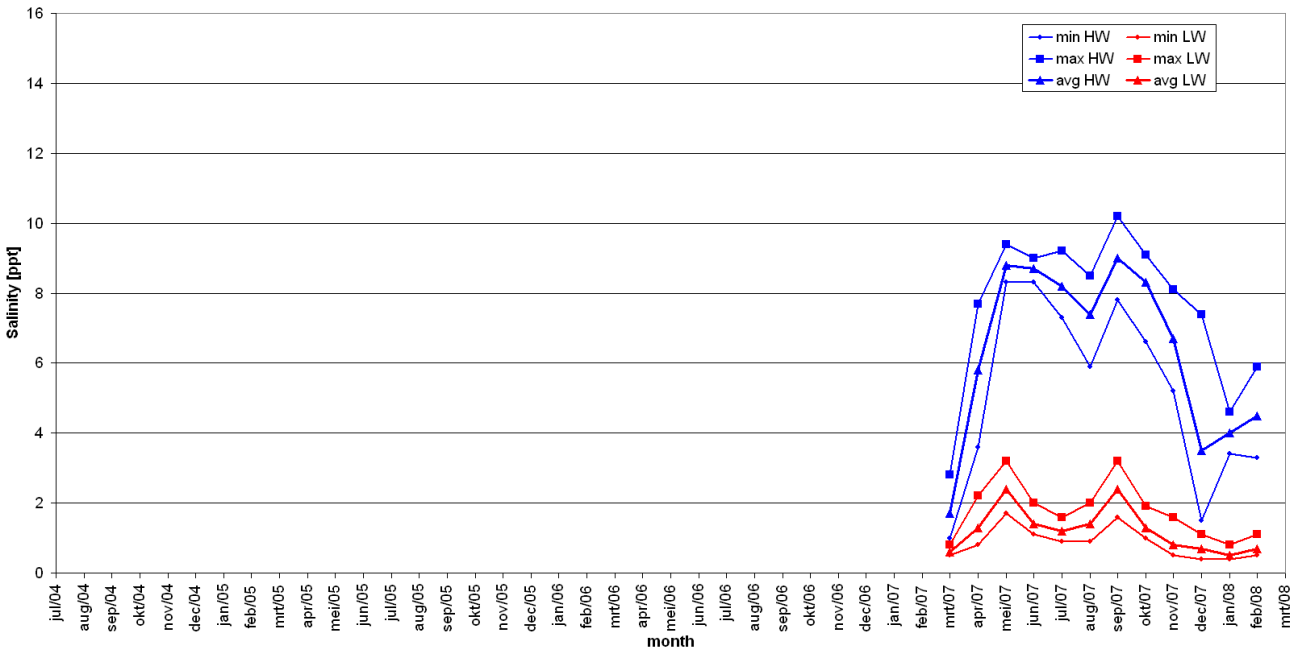


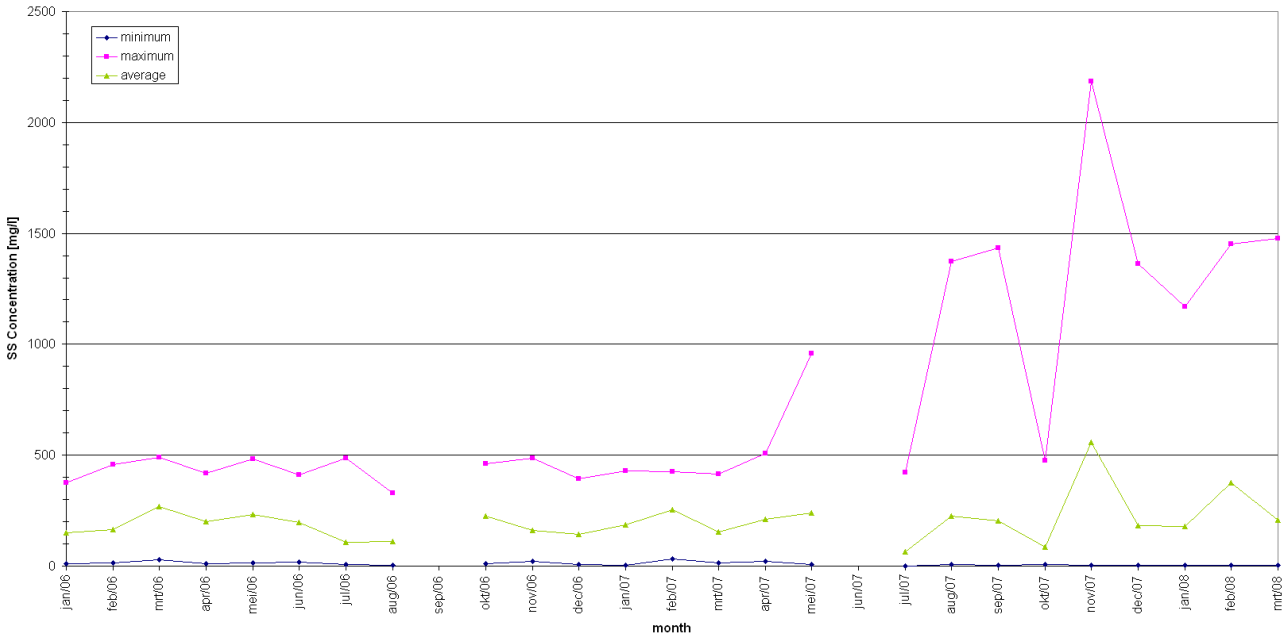


Oosterweel left bank **4.5m above bottom (-1.8m TAW)**	*Data processed by:* *In association with:*

I/RA/11283/07.100/MSA

Salinity & SS Concentration





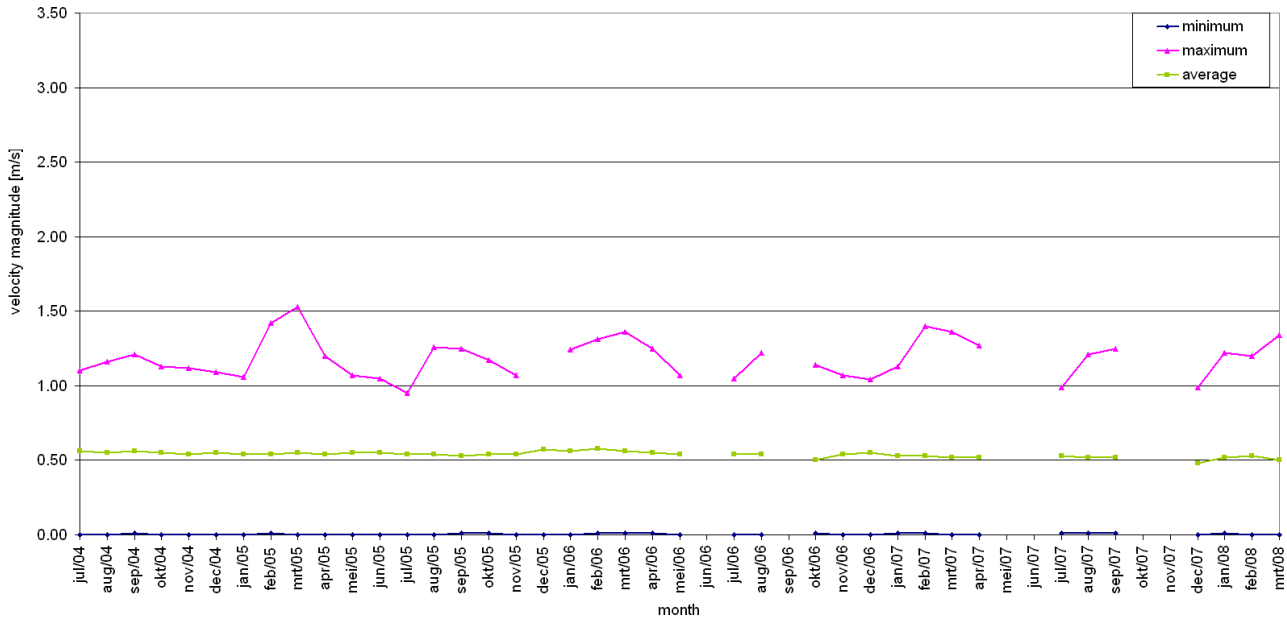
Oosterweel left bank
4.5m above bottom (-1.8m TAW)

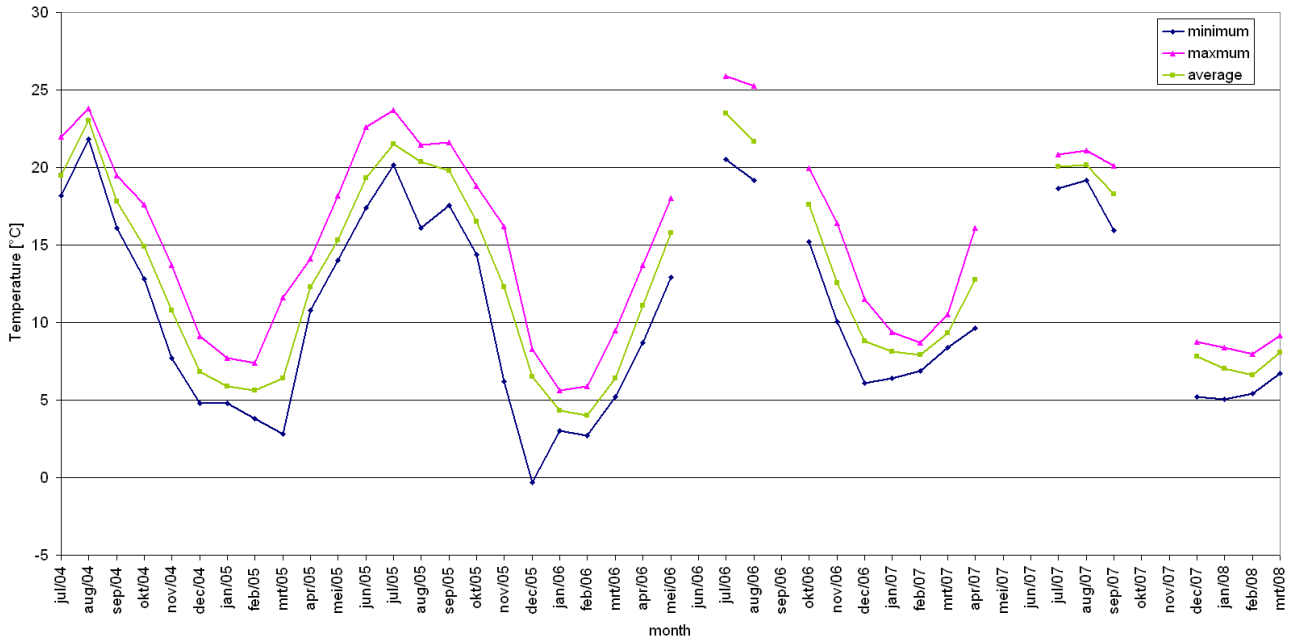
Data processed by:

In association with:

I/RA/11283/07.100/MSA

Velocity magnitude & temperature





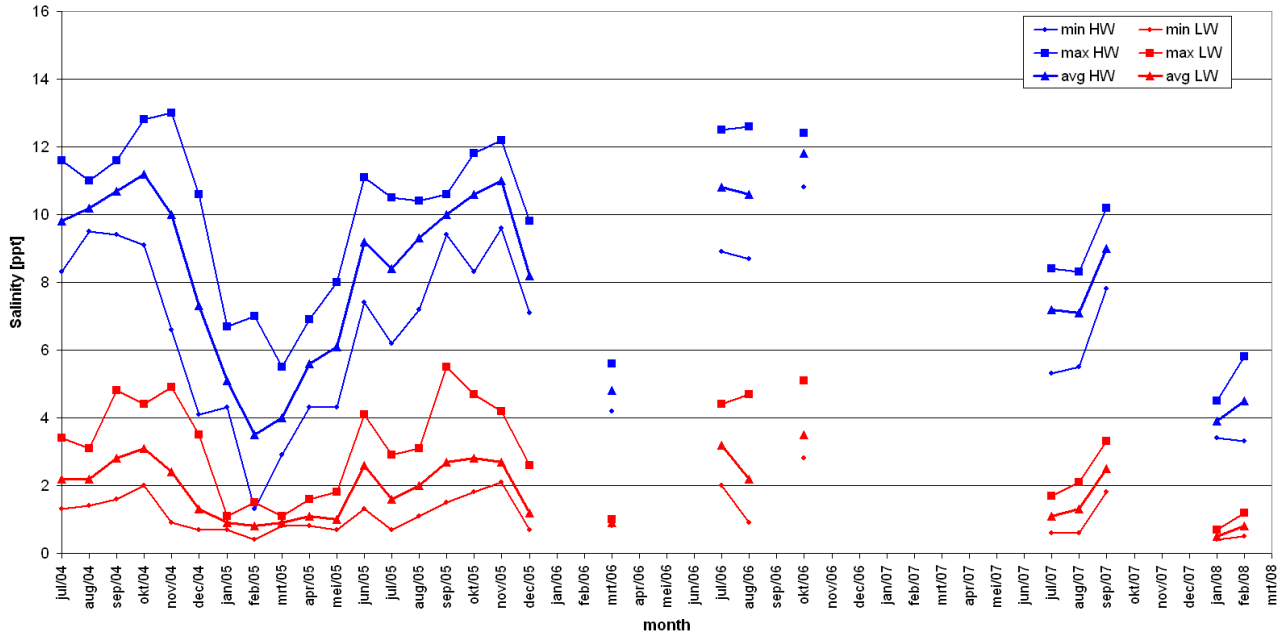
Oosterweel left bank
1m above bottom (-5.5m TAW)

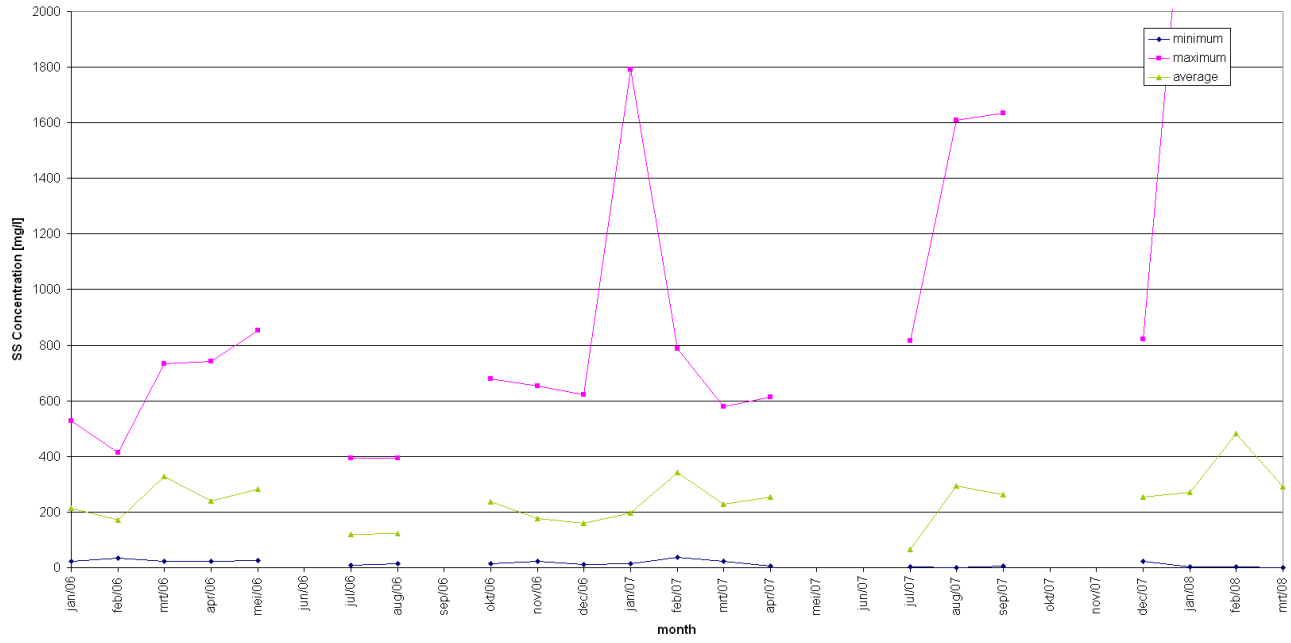
Data processed by:

In association with:

I/RA/11283/07.100/MSA

Salinity & SS Concentration





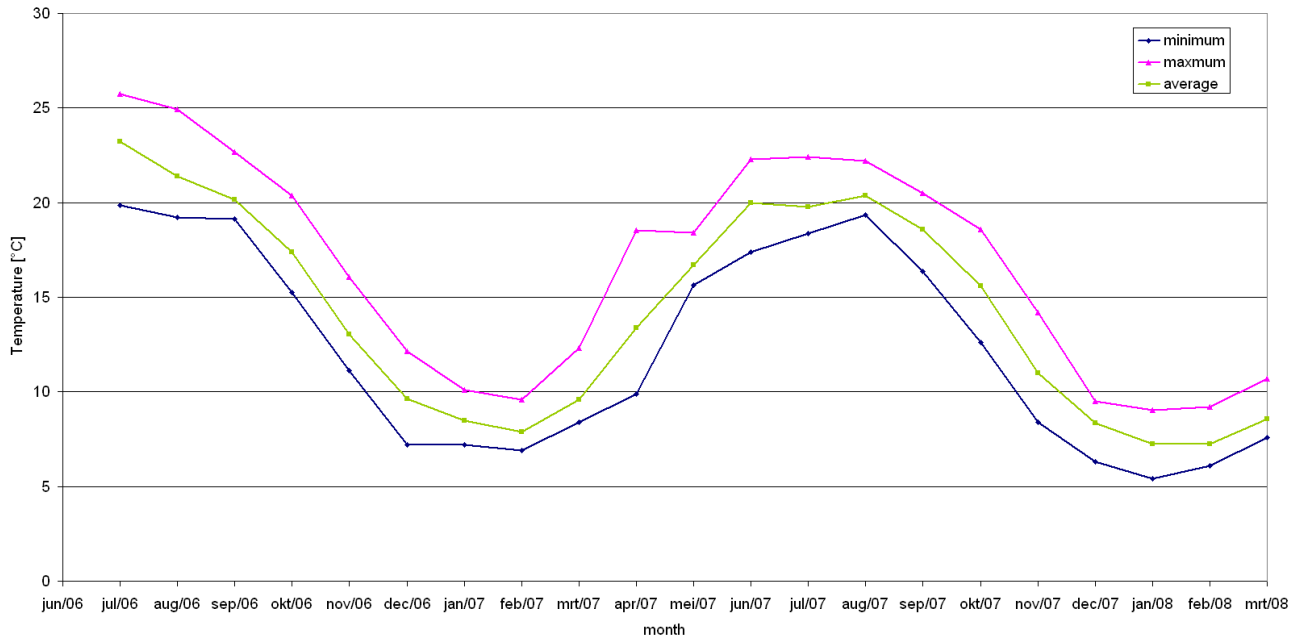
Oosterweel left bank
1m above bottom (-5.5m TAW)

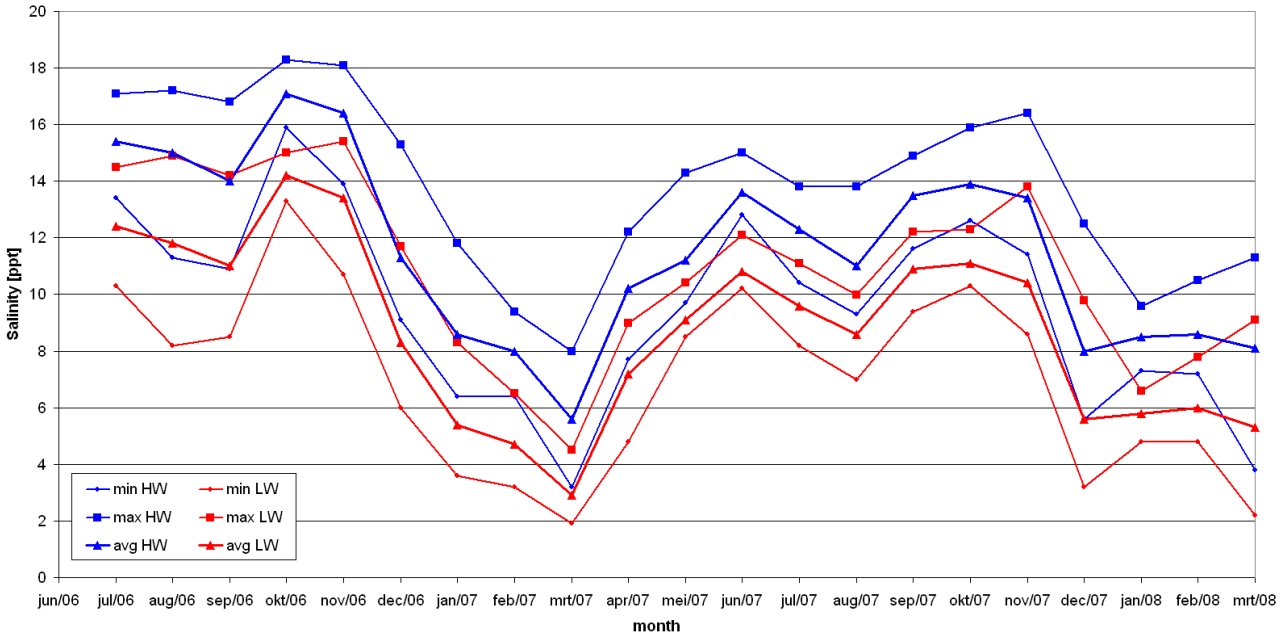
Data processed by: IMDC

In association with: WL | delft hydraulics, GEMS International

I/RA/11283/07.100/MSA

Temperature & Salinity





Propsperpolder
2.5m above bottom (-1.5m TAW)

Data processed by:

In association with:

I/RA/11283/07.100/MSA

C.4 Total result from January 2008 till March 2008 of velocity magnitude, temperature, salinity and suspended sediment concentration

Averages for the whole deployment period of each instrument [January 2008 – March 2008]

Location	***Depth [m TAW]***	***Velocity [m/s]***			***Temperature [°C]***			***SS concentration [mg/l]***		
		Min	***Max***	***Avg***	***Min***	***Max***	***Avg***	***Min***	***Max***	***Avg***
Oosterweel left bank	-1.8	0	1.54	0.66	4.2	9.2	7.1	2	1476	245
Oosterweel left bank	-5.5	0	1.34	0.52	5.0	9.2	7.3	1	4272	345
Prosperpolder	-1.5	-	-	-	5.4	10.7	7.8	-	-	-

Salinity [ppt]							
Location	**Depth [m TAW]**	**Minimum**		**Maximum**		**Average**	
		Slack HW	***Slack LW***	***Slack HW***	***Slack LW***	***Slack HW***	***Slack LW***
Oosterweel left bank	-1.8	3.3	0.4	6	2	4.3	0.6
Oosterweel left bank	-5.5	3*	0.4*	6*	2.1*	4.3*	0.7*
Prosperpolder	-1.5	3.8	2.2	11.3	9.1	8.4	5.6

-: No data or less than 30% of the monthly data available.
*: Less than 70% of the monthly data available.

APPENDIX D.

MONTHLY RESULTS: MINIMUM, MAXIMUM AND AVERAGE SALINITY AT BAALHOEK AND HOOFDPLAAT

Location: Baalhoek

Upper cell: floating at water surface

Lower cell: 4.7 meter above bottom [-3.1m TAW]

Salinity [ppt] (upper cell)			
Month	***Minimum***	***Maximum***	***Average***
January	6.7	15.2	10.8
February	-	-	-
March	-	-	-
Salinity [ppt] (lower cell)			
Month	***Minimum***	***Maximum***	***Average***
January	6.7	15.8	11.5
February	-	-	-
March	-	-	-

-: No data or less than 30% of monthly data available
*: Less than 70% of monthly data

Location: Hoofdplaat

Floating at water surface

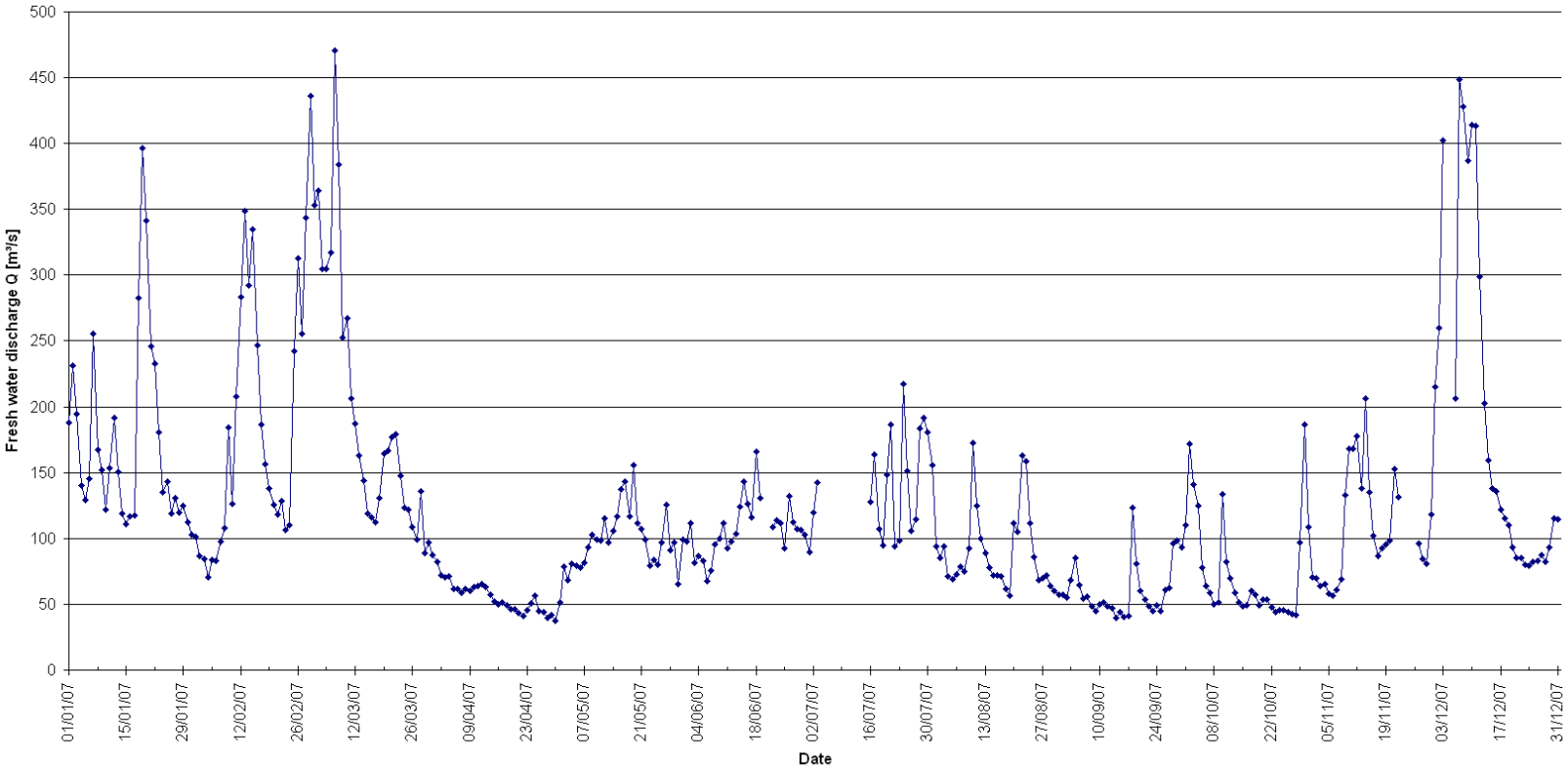
Salinity [ppt]			
Month	***Minimum***	***Maximum***	***Average***
January	-	-	-
February	-	-	-
March	-	-	-

-: No data or less than 30% of monthly data available
*: Less than 70% of monthly data

APPENDIX E.

FRESH WATER DISCHARGE

11283 Opvolging aanslibbing Deurganckdok – Omgevingscondities Januari - Maart 2008



Fresh water discharge

Location:
Schelle

Date:
01/01/2007 – 31/12/2007

Data processed by:

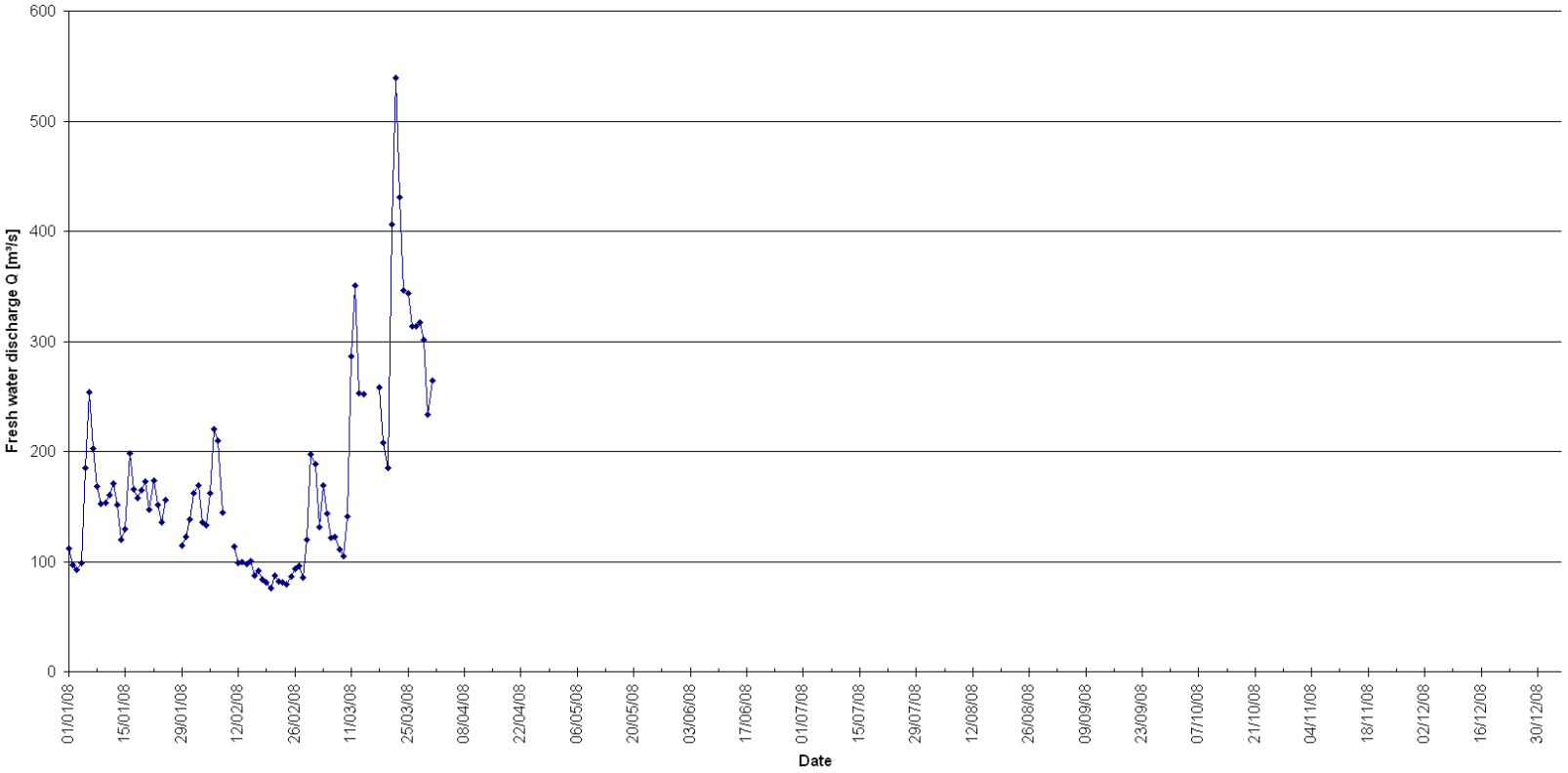
In association with:

WL | delft hydraulics

GEMS International

I/RA/11283/07.100/MSA

11283 Opvolging aanslibbing Deurganckdok – Omgevingscondities Januari - Maart 2008



Fresh water discharge

Location:	Date:	*Data processed by:* IMDC
Schelle	01/01/2008 – 31/03/2008	*In association with:* wl | delft hydraulics, GEMS International

I/RA/11283/07.100/MSA

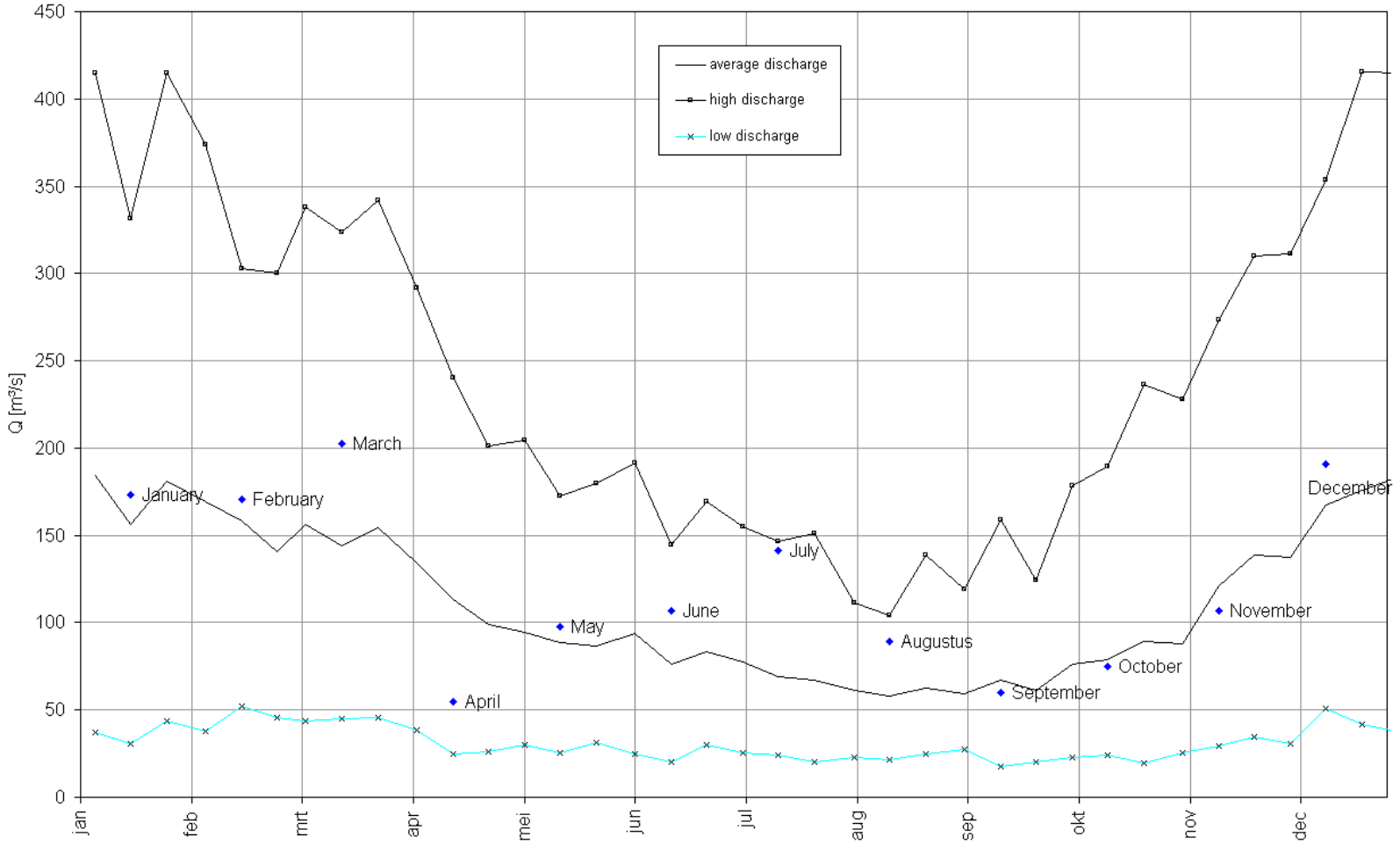
Decade averages of the fresh water discharge [m³/s] of the Scheldt at Schelle (January 2007 – December 2007)

	First Decade	***Second Decade***	***Third Decade***
January 2007	173	198	150
February 2007	103	219	202
March 2007	345	151	121
April 2007	67	54	45
May 2007	81	120	93
June 2007	91	122	110
July 2007	130	126	153
Augustus 2007	96	87	95
September 2007	62	58	65
October 2007	98	58	64
November 2007	82	130	109
December 2007	345	179	90

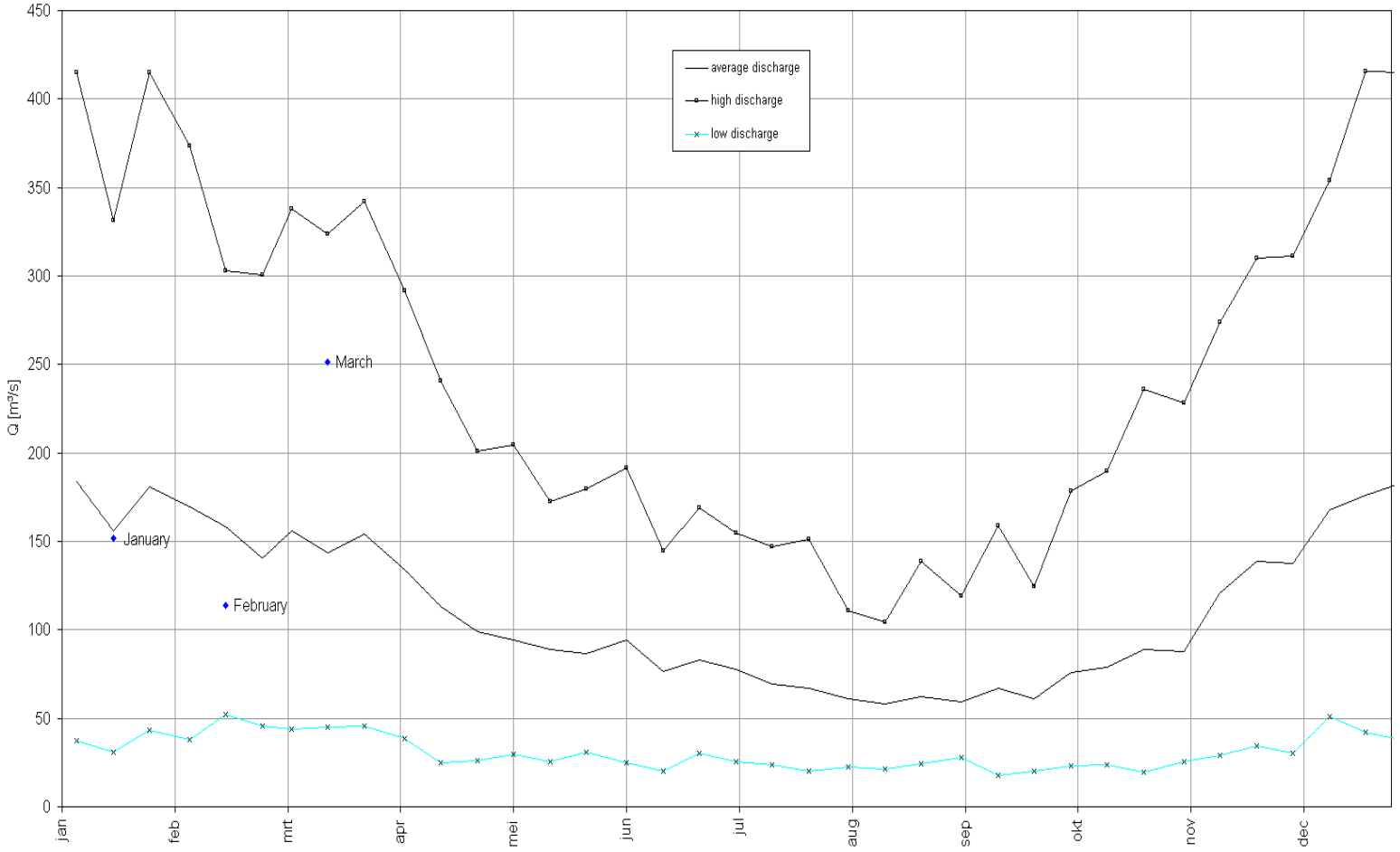
Decade averages of the fresh water discharge [m³/s] of the Scheldt at Schelle (January 2008 – March 2008)

	First Decade	***Second Decade***	***Third Decade***
January 2008	152	159	136
February 2008	160	93	90
March 2008	143	274	340

Average monthly discharge of 2007 compared to the long-term discharge curve (based on a long-term simulation over a period of 30 year; 1971-2000)



Average monthly discharge of 2008 compared to the long-term discharge curve (based on a long-term simulation over a period of 30 year; 1971-2000)



APPENDIX F.

OVERVIEW OF MAINTENANCE -DREDGING ACTIVITIES

Dredging and dumping volumes [10^3 m^3]

Dredging locations									
	Week 01	*Week 02*	*Week 03*	*Week 04*	*Week 05*	*Week 06*	*Week 07*	*Week 08*	*Week 09*
Drempel van Borssele	-	-	-	-	-	-	-	-	-
Pas van Terneuzen	-	-	43.88	-	-	-	-	-	-
Put van Terneuzen	-	67.60	-	-	4.72	82.96	-	-	22.37
Gat van Ossensisse	-	-	-	-	-	-	-	-	-
Drempel van Walsoorden	-	-	-	-	-	-	-	-	-
Overloop Hansweert	-	-	-	-	-	-	-	-	-
Drempel van Hansweert	-	-	-	-	-	-	-	-	-
Overloop van Valkenisse (B 56-62)	-	-	-	-	-	-	-	-	-
Drempel van Valkenisse	-	73.29	118.01	1.18	-	-	-	-	103.98
Drempel van Bath	-	-	44.40	80.48	3.99	3.93	-	-	-
Nauw van Bath (B 75)	-	-	-	1.96	-	5.13	-	91.11	64.34
Vaarwater Bath (B72-76)	-	-	-	-	-	-	-	-	39.59
Noordzeeterminal	-	-	-	-	-	-	-	-	8.84
Containerkaai noord	-	-	-	-	-	-	-	-	34.45
Containerkaai zuid	-	-	-	-	-	-	-	-	-
Vaarwater Oudendijk	-	-	-	-	-	-	-	-	-
Drempel van Zandvliet	-	-	-	-	-	-	-	-	-
Zandvliet+Berendrecht sluis	-	-	-	-	14.29	-	-	-	-
Drempel van Frederik	-	-	-	-	18.61	-	-	-	32.52
Drempel van Lillo	-	-	-	-	-	-	-	-	-
Lillo vaarwater plaat	-	-	-	39.40	23.26	-	-	-	82.93
Toeg Boud+Calew sluis	-	-	-	-	-	-	-	-	-
Deurganckdok	-	-	-	-	-	-	-	-	-
De Parel	-	-	-	-	-	-	-	-	-
Ketelplaat	-	-	-	-	58.88	60.92	55.47	3.85	-
Kallo sluis	-	-	-	-	-	-	-	-	-
Krankeloon	-	-	-	-	-	-	-	-	-
Kaaien 23-27	-	38.67	-	9.94	8.71	-	-	-	-

Dumping locations									
	Week 01	*Week 02*	*Week 03*	*Week 04*	*Week 05*	*Week 06*	*Week 07*	*Week 08*	*Week 09*
Spijkerplaat	-	39.26	43.88	-	4.72	82.96	-	-	22.37
Everingen	-	28.34	-	-	-	-	-	-	-
Ellewoutsdijk	-	-	-	-	-	-	-	32.03	105.45
Biezelingse Ham	-	73.29	162.41	83.62	3.99	9.06	-	59.08	145.73
Schaar van Waarde	-	-	-	-	-	-	-	-	-
Schaar Ouden Doel	-	-	-	32.32	56.16	-	-	-	71.53
Opspuitingen Deurganckdok	-	-	-	-	-	-	-	-	-
Oosterweel	-	20.18	-	5.61	33.00	31.09	26.00	2.95	13.31
Plaat van Boomke	-	11.97	-	11.71	34.59	29.83	29.47	0.90	30.60
Punt van Melsele	-	6.52	-	-	-	-	-	-	-
Opspuitingen Kruibeke	-	-	-	-	-	-	-	-	-

Dredging locations									
	Week 10	*Week 11*	*Week 12*	*Week 13*	*Week 14*				
Drempel van Borssele	-	-	-	-	-				
Pas van Terneuzen	-	-	-	-	-				
Put van Terneuzen	48.82	-	-	-	9.07				
Gat van Ossensisse	-	-	-	-	-				
Drempel van Walsoorden	-	-	-	-	-				
Overloop Hansweert	1.98	-	-	-	-				
Drempel van Hansweert	-	-	-	-	-				
Overloop van Valkenisse (B 56-62)	-	-	-	-	-				
Drempel van Valkenisse	35.92	71.99	-	-	-				
Drempel van Bath	-	-	141.04	132.71	33.38				
Nauw van Bath (B 75)	-	-	-	-	-				
Vaarwater Bath (B72-76)	-	35.81	4.04	-	-				
Noordzeeterminal	-	31.79	8.03	-	-				
Containerkaai noord	-	4.01	-	-	-				
Containerkaai zuid	-	-	-	-	-				
Vaarwater Oudendijk	-	-	-	-	-				
Drempel van Zandvliet	-	-	-	-	-				
Zandvliet+Berendrecht sluis	-	-	-	-	-				
Drempel van Frederik	-	-	96.80	84.36	31.47				
Drempel van Lillo	-	-	-	-	-				
Lillo vaarwater plaat	-	-	61.81	56.03	-				
Toeg Boud+Calew sluis	-	35.32	2.31	-	-				
Deurganckdok	-	-	-	-	-				
De Parel	16.06	12.60	-	-	-				
Ketelplaat	52.89	-	-	-	-				
Kallo sluis	47.12	20.09	-	-	-				
Krankeloon	-	-	-	-	-				
Kaaien 23-27	-	7.02	-	-	-				

Dumping locations									
	Week 10	*Week 11*	*Week 12*	*Week 13*	*Week 14*				
Spijkerplaat	49.80	-	-	-	9.07				
Everingen	-	-	-	-	-				
Ellewoutsdijk	16.05	47.99	56.33	48.06	13.44				
Biezelingse Ham	20.88	95.61	96.77	84.65	-				
Schaar van Waarde	-	-	-	-	19.94				
Schaar Ouden Doel	5.08	42.15	139.45	98.21	31.47				
Opspuitingen Deurganckdok	-	-	-	-	-				
Oosterweel	38.64	11.60	-	-	-				
Plaat van Boomke	30.31	8.01	-	-	-				
Punt van Melsele	-	-	-	-	-				
Opspuitingen Kruibeke	46.73	41.72	26.14	42.18	-				

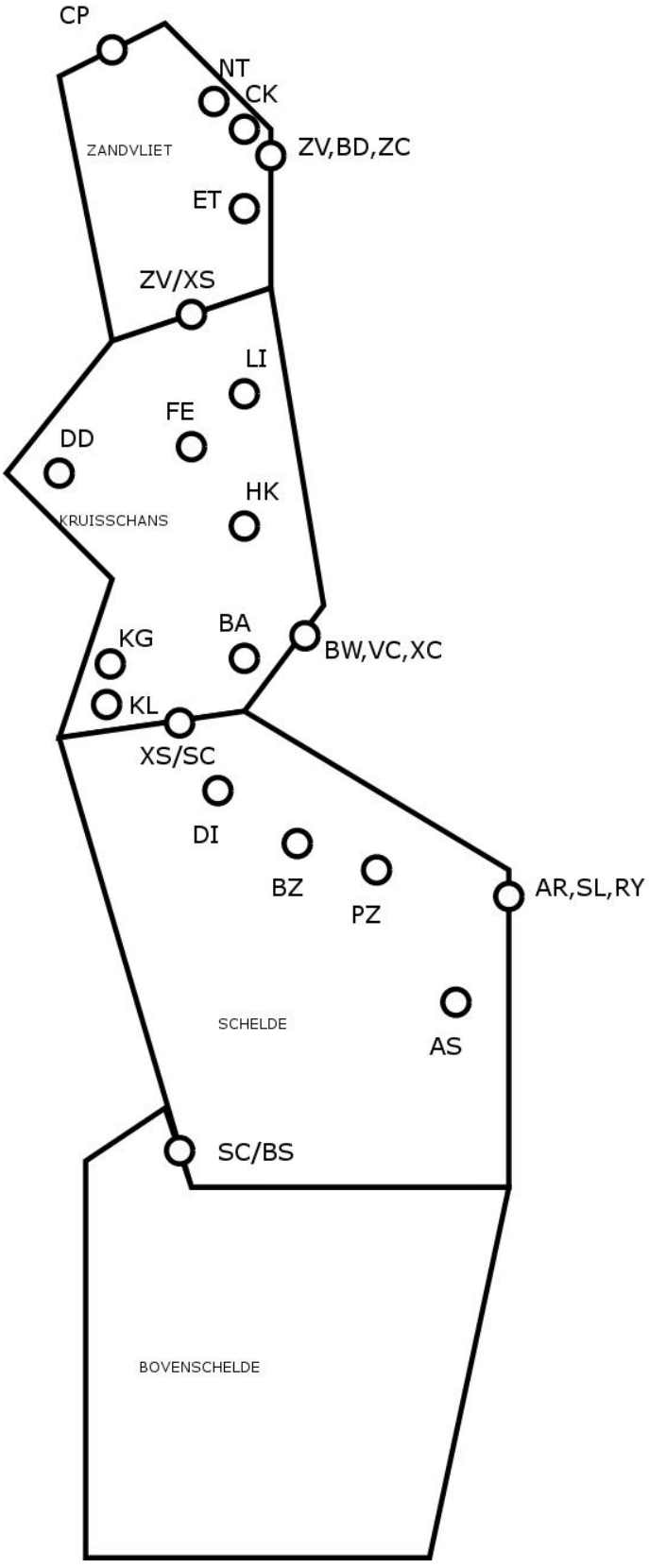
APPENDIX G.

NAVIGATION

G.1 Description of the areas

Area	*Global description*	*Detailed description*
1	Belgian border → Locks of Zandvliet – Berendrecht	Transit point CP → exit/entry point ZC, BD, ZV, NT, CK, ET or transit point ZV/XS
2	Locks of Zandvliet – Berendrecht → Deurganckdok	Transit point CP or entry/exit point ZC, BD, ZV, NT, CK, ET → transit point ZV/XS
3	Deurganckdok → Lock of Kallo	Transit point ZV/XS or entry/exit point DD → exit/entry point BA, BW, FE, HK, KG, KL, LI, VC, XC or transit point XS/SC
4	Lock of Kallo → Lock of Royers	Transit point XS/SC or entry/exit point DD, BA, BW, FE, HK, KG, KL, LI, VC, XC → entry/exit point AR, AS, BZ, DI, KT, PZ, RY, SL or transit point SC/BS

	CID	MEANING	TYPE
GA	GEBIED ANTWERPEN		
SA	Saeftinge		
	CP	Coordinatiepunt (blokgrens SA/ZV)	P
	CP2	Coordinatiepunt (blokgrens SA/ZV)	P
SC	Schelde		
	AR	Antwerpen Rede	E
	AS	Antwerpen Scheldekade/steiger	E
	AX	Antwerpen zonder detaillering	E
	BZ	BP Zwijndrecht	E
	DI	Haven Dredging International	E
	PZ	Polysar Zwijndrecht	E
	RY	Royerssluis	E
	SC/BS	Blokgrens SC/BS (boveneinde rede Antwerpen)	P
	SL	Sluizen Antwerpen Rechteroever	E
XS	Kruisschans		
	BA	Bayer Kallo	E
	BW	Boudewijnsluis	E
	DD	Deurganckdok	E
	FE	Steiger Fenol	E
	HK	Steiger Haltermann	E
	KG	Kallo geul	E
	KL	Kallosluis	E
	LI	Steiger Lillo	E
	VC	Van Cauwelaertsluis	E
	XC	Kruisschanssluiscomplex	E
	XS/SC	Blokgrens Kruisschans / Schelde	P
	XS/SC2	Blokgrens Kruisschans / Schelde	P
ZV	Zandvliet		
	BD	Berendrechtsluis	E
	CK	Containerkade Antwerpen	E
	ET	Europaterminal	E
	NT	Noordzeeterminal	E
	ZC	Zandvliet / Berendrecht sluiszencomplex	E
	ZV	Zandvliet sluis	E
	ZV/XS	Blokgrens Zandvliet / Kruisschans	P
	ZV/XS2	Blokgrens Zandvliet / Kruisschans	P



Sketch of the different areas of navigation

G.2 Weekly data

Week 01 (31/12/2007 – 06/01/2008)						
Area	***Draught***	***Total***	***Inland navigation***	***Seagoing***	***Arrival***	***Departure***
1	Unknown	127	120	7	17	106
	0 – 8 m	880	446	433	428	449
	8 – 12 m	228	0	228	70	158
	> 12 m	30	0	30	5	25
2	Unknown	147	139	8	37	106
	0 – 8 m	632	383	248	345	284
	8 – 12 m	87	0	87	42	45
	> 12 m	8	0	8	3	5
3	Unknown	155	146	9	29	122
	0 – 8 m	584	362	221	320	260
	8 – 12 m	56	0	56	27	29
	> 12 m	0	0	0	0	0
4	Unknown	40	35	5	24	16
	0 – 8 m	144	108	35	101	43
	8 – 12 m	0	0	0	0	0
	> 12 m	0	0	0	0	0
Week 02 (07/01/2008 – 13/01/2008)						
Area	***Draught***	***Total***	***Inland navigation***	***Seagoing***	***Arrival***	***Departure***
1	Unknown	60	55	4	11	49
	0 – 8 m	828	427	400	342	481
	8 – 12 m	204	0	204	60	144
	> 12 m	24	0	24	3	21
2	Unknown	72	64	7	18	54
	0 – 8 m	599	355	243	291	303
	8 – 12 m	72	0	72	36	36
	> 12 m	2	0	2	2	0
3	Unknown	67	61	5	13	54
	0 – 8 m	556	336	219	271	280
	8 – 12 m	31	0	31	17	14
	> 12 m	2	0	2	2	0
4	Unknown	23	22	1	11	12
	0 – 8 m	136	91	45	95	41
	8 – 12 m	0	0	0	0	0
	> 12 m	0	0	0	0	0

Week 03 (14/01/2008 – 20/01/2008)						
Area	***Draught***	***Total***	***Inland navigation***	***Seagoing***	***Arrival***	***Departure***
1	Unknown	80	76	4	20	58
	0 – 8 m	789	427	361	376	410
	8 – 12 m	206	0	206	68	138
	> 12 m	18	0	18	2	16
2	Unknown	82	78	4	27	53
	0 – 8 m	574	371	202	306	265
	8 – 12 m	92	0	92	49	43
	> 12 m	3	0	3	0	3
3	Unknown	74	70	4	20	52
	0 – 8 m	520	349	170	279	238
	8 – 12 m	51	0	51	25	26
	> 12 m	1	0	1	0	1
4	Unknown	18	17	1	10	8
	0 – 8 m	161	121	40	117	43
	8 – 12 m	0	0	0	0	0
	> 12 m	0	0	0	0	0
Week 04 (21/01/2008 – 27/01/2008)						
Area	***Draught***	***Total***	***Inland navigation***	***Seagoing***	***Arrival***	***Departure***
1	Unknown	80	75	4	13	66
	0 – 8 m	883	428	453	397	485
	8 – 12 m	221	0	221	65	156
	> 12 m	20	0	20	4	16
2	Unknown	84	76	7	17	66
	0 – 8 m	641	380	259	334	306
	8 – 12 m	95	0	95	42	53
	> 12 m	5	0	5	2	3
3	Unknown	88	79	8	17	69
	0 – 8 m	604	360	242	313	290
	8 – 12 m	60	0	60	26	34
	> 12 m	0	0	0	0	0
4	Unknown	14	12	2	9	5
	0 – 8 m	139	92	46	92	47
	8 – 12 m	3	0	3	1	2
	> 12 m	0	0	0	0	0

Week 05 (28/01/2008 – 03/02/2008)						
Area	***Draught***	***Total***	***Inland navigation***	***Seagoing***	***Arrival***	***Departure***
1	Unknown	79	76	3	16	63
	0 – 8 m	811	429	380	363	441
	8 – 12 m	188	0	188	66	122
	> 12 m	32	0	32	6	26
2	Unknown	80	76	4	21	59
	0 – 8 m	591	363	227	301	283
	8 – 12 m	83	0	83	44	39
	> 12 m	9	0	9	4	5
3	Unknown	84	81	3	19	64
	0 – 8 m	549	348	200	277	265
	8 – 12 m	52	0	52	27	25
	> 12 m	1	0	1	1	0
4	Unknown	27	27	0	15	12
	0 – 8 m	123	80	43	89	33
	8 – 12 m	1	0	1	1	0
	> 12 m	0	0	0	0	0
Week 06 (04/02/2008 – 10/02/2008)						
Area	***Draught***	***Total***	***Inland navigation***	***Seagoing***	***Arrival***	***Departure***
1	Unknown	108	104	3	21	86
	0 – 8 m	836	418	417	380	454
	8 – 12 m	206	0	206	62	144
	> 12 m	36	0	36	9	27
2	Unknown	89	84	4	24	64
	0 – 8 m	615	358	256	318	295
	8 – 12 m	82	0	82	36	46
	> 12 m	6	0	6	3	3
3	Unknown	87	82	4	22	63
	0 – 8 m	576	343	232	302	272
	8 – 12 m	50	0	50	20	30
	> 12 m	2	0	2	2	0
4	Unknown	29	24	4	13	14
	0 – 8 m	167	111	55	116	51
	8 – 12 m	1	0	1	0	1
	> 12 m	0	0	0	0	0

Week 07 (11/02/2008 – 17/02/2008)						
Area	***Draught***	***Total***	***Inland navigation***	***Seagoing***	***Arrival***	***Departure***
1	Unknown	89	88	0	19	70
	0 – 8 m	945	486	457	429	510
	8 – 12 m	217	0	217	66	151
	> 12 m	26	0	26	5	21
2	Unknown	86	80	5	19	67
	0 – 8 m	695	408	285	356	333
	8 – 12 m	87	0	87	37	50
	> 12 m	7	0	7	4	3
3	Unknown	78	75	2	17	61
	0 – 8 m	648	394	252	329	313
	8 – 12 m	51	0	51	19	32
	> 12 m	0	0	0	0	0
4	Unknown	28	27	0	12	16
	0 – 8 m	170	105	63	120	49
	8 – 12 m	0	0	0	0	0
	> 12 m	0	0	0	0	0
Week 08 (18/02/2008 – 24/02/2008)						
Area	***Draught***	***Total***	***Inland navigation***	***Seagoing***	***Arrival***	***Departure***
1	Unknown	103	100	3	20	82
	0 – 8 m	872	457	414	414	457
	8 – 12 m	214	1	213	73	141
	> 12 m	35	2	33	6	29
2	Unknown	91	86	5	21	69
	0 – 8 m	653	401	252	347	305
	8 – 12 m	96	1	95	48	48
	> 12 m	7	2	5	4	3
3	Unknown	92	89	3	21	70
	0 – 8 m	621	387	234	327	293
	8 – 12 m	49	1	48	23	26
	> 12 m	3	2	1	2	1
4	Unknown	30	30	0	14	16
	0 – 8 m	165	112	53	117	47
	8 – 12 m	3	1	2	1	2
	> 12 m	0	0	0	0	0

Week 09 (25/02/2008 – 02/03/2008)						
Area	***Draught***	***Total***	***Inland navigation***	***Seagoing***	***Arrival***	***Departure***
1	Unknown	111	106	4	16	93
	0 – 8 m	802	422	379	374	427
	8 – 12 m	207	0	207	65	142
	> 12 m	25	0	25	5	20
2	Unknown	114	108	5	27	85
	0 – 8 m	603	370	232	324	278
	8 – 12 m	85	0	85	42	43
	> 12 m	5	0	5	3	2
3	Unknown	112	106	5	19	90
	0 – 8 m	570	354	215	307	262
	8 – 12 m	46	0	46	23	23
	> 12 m	0	0	0	0	0
4	Unknown	30	30	0	9	21
	0 – 8 m	159	109	50	118	41
	8 – 12 m	0	0	0	0	0
	> 12 m	0	0	0	0	0
Week 10 (03/03/2008 – 09/03/2008)						
Area	***Draught***	***Total***	***Inland navigation***	***Seagoing***	***Arrival***	***Departure***
1	Unknown	61	59	1	12	46
	0 – 8 m	876	485	390	412	464
	8 – 12 m	193	0	193	65	128
	> 12 m	33	0	32	4	29
2	Unknown	56	54	1	13	41
	0 – 8 m	668	405	262	348	320
	8 – 12 m	80	0	80	37	43
	> 12 m	10	0	9	2	8
3	Unknown	59	57	1	14	43
	0 – 8 m	624	389	234	324	300
	8 – 12 m	42	0	42	15	27
	> 12 m	1	0	0	1	0
4	Unknown	23	22	0	9	13
	0 – 8 m	156	99	56	108	48
	8 – 12 m	1	0	1	0	1
	> 12 m	0	0	0	0	0

Week 11 (10/03/2008 – 16/03/2008)						
Area	***Draught***	***Total***	***Inland navigation***	***Seagoing***	***Arrival***	***Departure***
1	Unknown	92	84	6	15	74
	0 – 8 m	772	393	379	365	400
	8 – 12 m	203	0	203	57	146
	> 12 m	37	1	36	8	29
2	Unknown	101	85	14	21	77
	0 – 8 m	553	327	226	301	246
	8 – 12 m	78	0	78	36	42
	> 12 m	6	0	6	3	3
3	Unknown	96	84	10	16	77
	0 – 8 m	526	318	208	287	232
	8 – 12 m	45	0	45	20	25
	> 12 m	1	0	1	1	0
4	Unknown	29	25	4	13	16
	0 – 8 m	133	94	39	97	35
	8 – 12 m	1	0	1	0	1
	> 12 m	1	0	1	1	0
Week 12 (17/03/2008 – 23/03/2008)						
Area	***Draught***	***Total***	***Inland navigation***	***Seagoing***	***Arrival***	***Departure***
1	Unknown	52	46	6	6	46
	0 – 8 m	829	447	382	400	423
	8 – 12 m	210	0	210	63	147
	> 12 m	30	1	29	8	22
2	Unknown	49	43	6	5	44
	0 – 8 m	613	388	225	326	283
	8 – 12 m	85	0	85	39	46
	> 12 m	8	1	7	4	4
3	Unknown	48	42	6	7	41
	0 – 8 m	582	381	201	307	271
	8 – 12 m	51	0	51	22	29
	> 12 m	1	1	0	0	1
4	Unknown	16	15	1	11	5
	0 – 8 m	156	104	52	105	50
	8 – 12 m	0	0	0	0	0
	> 12 m	0	0	0	0	0

Week 13 (24/03/2008 – 30/03/2008)						
Area	***Draught***	***Total***	***Inland navigation***	***Seagoing***	***Arrival***	***Departure***
1	Unknown	75	71	3	20	52
	0 – 8 m	752	366	385	358	391
	8 – 12 m	183	0	183	58	125
	> 12 m	25	0	25	4	21
2	Unknown	68	61	6	18	47
	0 – 8 m	542	305	236	290	249
	8 – 12 m	71	0	71	35	36
	> 12 m	6	0	6	2	4
3	Unknown	66	60	5	18	45
	0 – 8 m	504	288	216	268	233
	8 – 12 m	45	0	45	24	21
	> 12 m	0	0	0	0	0
4	Unknown	12	10	2	6	6
	0 – 8 m	123	82	41	90	33
	8 – 12 m	1	0	1	0	1
	> 12 m	0	0	0	0	0
Week 14 (31/03/2008 – 06/04/2008)						
Area	***Draught***	***Total***	***Inland navigation***	***Seagoing***	***Arrival***	***Departure***
1	Unknown	103	99	3	18	83
	0 – 8 m	794	412	380	372	421
	8 – 12 m	195	1	194	63	132
	> 12 m	18	0	18	2	16
2	Unknown	98	92	5	22	74
	0 – 8 m	584	360	223	311	272
	8 – 12 m	91	1	90	44	47
	> 12 m	3	0	3	1	2
3	Unknown	97	92	4	19	77
	0 – 8 m	546	347	198	293	251
	8 – 12 m	60	1	59	27	33
	> 12 m	0	0	0	0	0
4	Unknown	24	23	1	9	15
	0 – 8 m	149	99	49	99	50
	8 – 12 m	0	0	0	0	0
	> 12 m	0	0	0	0	0